Effects of Immediate Knowledge of Results and Test Anxiety on Achievement Test Performance in a College Classroom Setting

A Thesis

Submitted to the Faculty

of the Graduate School

of the University of Minnesota

by

Marjorie Fugate Fruin

In Partial Fulfillment of the Requirements

for the Degree of

Doctor of Philosophy

March 1979

Marjorie Fugate Fruin
480 words

ABSTRACT

This study examined effects of test anxiety level and immediate knowledge of results (KR) during testing in an actual class with the test scores being used for course grades. Subjects were 78 volunteers in an introductory nutrition course. Hypotheses were that students having "facilitative" test anxiety would normally show higher achievement on tests than students having "debilitative" test anxiety, but that the latter would show higher achievement when immediate KR was provided because provision of KR would focus attention on the task. The study also examined whether there were characteristics besides test anxiety indicative of liking for immediate KR and choice of KR for the third and last course exam. Other areas investigated included influence of test reliability, possible bias introduced by the informed consent requirement, and whether a "self-focus" as opposed to a "task-focus" orientation could be identified for subjects.

Scores on the Achievement Anxiety Test (AAT) were categorized into Most Affecteds, Facilitators, Debilitators, and Least Affecteds and subjects were randomly assigned to one of three groups: Group 1 received KR on test 1 but not on test 2; Group 2 received KR on test 2 but not on test 1; and Group 3, the control group, never received KR. Prior to test 3, Groups 1 and 2 chose whether they would like to receive KR on test 3, the last course exam. Immediate KR was provided using pre-coded answer sheets which subjects marked with chemically treated wax crayons.

Results indicated that subjects did not show significantly different achievement regardless of anxiety level or provision of immediate KR, although a pattern of the group means suggested ($p=.07$) that the performance of Facilitators and Least Affecteds might have been inhibited while that of Debilitators and Most AFfecteds might have been enhanced by KR. Analysis of covariance indicated that test score variability could be accounted for by self-reported GPA. Item analysis of the achievement tests indicated that students found the tests easy, which suggested that results might not have been significant because ability levels of subjects were high and all were able to do well. It is thus possible that test difficulty, and hence ability level, may play an important role in whether test anxiety level and/or immediate KR will facilitate achievement test performance in the classroom.

Subjects reported that they liked receiving immediate KR, although approximately 30 percent said they would rather not know whether their answers were right or wrong. About 30 percent elected not to receive KR on the last course exam. No significant descriptive characteristics could be attributed to those choosing or not choosing KR, to differing test anxiety levels, or to test achievement. Descriptive characteristics of the "self-focus" construct could not be identified.

Provision of immediate KR on classroom achievement tests appeared to be relatively expensive, and was time consuming to prepare and to use. Therefore, cost/effectiveness must be considered.

ACKNOWLEDGEMENTS

Expressions of appreciation are usually inadequate, and often unread. Yet, there are persons who must be recognized because to them belongs the credit for most of the sense and accuracy of my research and my thesis: my adviser, John E. Stecklein; my thesis panel, James Terwilliger and John P. Campbell; and my committee members, Reynold Willie and George England. I am most grateful for their time, their ability, and their help.

In addition, I would like to thank Sister Ingrid Anderson for her tolerance of the study itself, and Jan Swanson and Paula Garvey for their nurturance of the text and tables of this manuscript.

I must also gratefully acknowledge the assistance of my colleagues and friends in the Department of Food Science and Nutrition, who never wavered in their patience and encouragement, and the members of my family, who lived and breathed the pitfalls and the triumphs of the whole five and a half years.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF FIGURES

INTRODUCTION

Through the years educational psychologists have actively pursued the development of methods and procedures to assist the classroom teacher in facilitating and evaluating student learning. Extensive research effort has been directed toward the identification and testing of theories of learning, which could in turn be operationalized in the classroom setting. One component of this research has been the measurement of student performance on tests. Such studies have supplied two types of information. They have helped to identify what might have been learned, and they have suggested ways in which learning might be more effectively measured.

Measurement specialists have examined the testing situation, the test items, and the characteristics of the testees themselves, as well as possible interactions among and between such characteristics (Brown, 1976). Although there are many published reports of the results of these investigations, some valuable and some less so, classroom teachers and others remain hard pressed to know for certain

whether a test score is an accurate reflection of student achievement.

In addition to the ever present work on reliability and validity, researchers have begun to seriously study attributes of individuals being tested. Within the past two decades, the construct of test anxiety has received considerable attention, particularly in the literature dealing with counseling methods. This construct basically postulates the existence of a tendency for some individuals in testing situations to experience reactions which interfere with optimal performance (Mandler and S. Sarason, 1952). A related view of test anxiety (Spielberger, Gorsuch, and Lushene, 1970) postulates that it is possible to differentiate a more general anxiety (A-trait) from anxiety which is specific to the testing situation (A-state). A-state is believed to be detrimental to test performance, and can be distinguished from A-trait, which tends to persist outside of testing situations.

Others maintain that the test anxiety construct consists of two types of anxiety, one which "facilitates" or enhances performance and one which "debilitates" or is detrimental to performance (Alpert and Haber, 1960). These authors have presented extensive evidence that facilitative anxiety, as measured by their F Scale, shows high positive correlations with measures of achievement, such as GPA. On the other hand, debilitating anxiety, as measured by their D Scale, shows strong negative correlations with GPA.

These three slightly differing theories of test anxiety have led to the development of three different instruments. In addition,

adaptations of these three insturments have been used both in an attempt to extend theory and to meet specific testing conditions. This fact may contribute to the inconclusive and sometimes contradictory results that have been reported.

However, this work cannot be dismissed. Although a comprehensive theory has not been defined, results to date justify continued research to find ways to mitigate a problem which seems to exist in the testing situation.

Wine (1971) has suggested that highly test-anxious persons may not be attending to the task at hand, but rather may be worrying about how they will perform, what other people will think of their performance, or other concerns which are irrelevant at the moment. Wine postulates that methodologies which would focus the attention of these individuals on the task (test) might serve to improve their performance.

One such method, as yet untried for the purpose of focusing the attention of test anxious subjects during testing, is the provision of feedback. It is necessary at this point to first briefly examine the nature of feedback, and how it has been utilized by researchers in educational psychology.

Feedback has been defined as any procedure--ranging from knowledge that an answer is correct or incorrect all the way to complex new instruction--that informs learners of their performance (Kulhavy, 1977). To be employed consistent with reinforcement theory, feedback must be immediate, but studies of learning indicate that delayed feedback is more effective in facilitating learning (McKeachie, 1974).

Generally, feedback facilitates learning. The provision of feedback during testing, to inform testees of the correctness of their answers, has been utilized by a limited number of researchers to facilitate test performance rather than learning. In these studies, feedback, usually called immediate knowledge of results (KR), has been variously shown to cause increased errors (Bierbaum, 1965; Strang and Rust, 1973), to improve performance (Betz and Weiss, 1976a), or to have little effect (Beeson, 1973). One study which utilized KR with the intent of reducing anxiety (Morris and Fulmer, 1976) found that such was not the case; in fact, subjects provided immediate KR reported higher anxiety than those who did not receive KR.

Wine's (1971) suggestion that highly test anxious subjects tend to exhibit a self-focus rather than a task-focus has not been addressed in the relatively limited literature regarding the provision of KR during testing. Nor has it really been examined in the much larger numbers of studies concerning test anxiety.

The highly test anxious student has not been ignored, however. Spielberger, Anton, and Bedell (1976) have reviewed a vast amount of work which examined methodologies for overcoming the debilitating effects of test anxiety. The authors concluded that desensitization techniques could alleviate test anxiety, although test performance was not demonstrably improved unless therapy also included counseling in study skills. Conceivably, study skills could be viewed as a form of task-focus. It would seem that improving study skills could influence many factors which might be involved in test anxiety, such

as feelings of confidence, motivation, satisfaction with coursework, and, of course, learning.

As a matter of fact, measures of ability and/or past achievement have been studied in relation to test anxiety. Alpert and Haber (1960) presented evidence of the correlation between their anxiety measure and measures of ability and achievement, concluding that the anxiety measure explained additional variance beyond that explained by such measures. However, Boor (1972) was unable to find significant correlations between achievement test scores and scores on two different measures of test anxiety after partialing out the effects of scores on two subscales of the Wechsler Adult Intelligence Scales. These seemingly contradictory results have apparently been ignored by other authors publishing in the area.

Furthermore, only one study reported psychometric properties of the instrument used to measure the dependent variable test scores (Betz and Weiss, 1976a). This study was concerned with ability test items. Those investigators using classroom achievement tests scores as their dependent variable have uniformly neglected to report reliability estimates. Developers of test anxiety measures have tended to utilize standardized measures of ability and/or achievement in constructing their scales, but researchers who have used these anxiety measures in the classroom have not been able to do this. Since classroom tests are not so carefully constructed as standardized tests, reliabilities are likely to be quite low (Brown, 1976).

It is therefore difficult to place much reliance on studies which

report effects of feedback or test anxiety on test performance. When one considers the probable lack of adequate reliability and the mixed findings that have been published, one is tempted to disregard most, if not all, that has been reported.

This is not to say, however, that test anxiety should be ignored. The continued interest in the area testifies to the fact that many researchers feel that there must be something worth investigating. The present author has shared that concern, because highly test anxious individuals probably are not performing as well as they could be. If it is within the scope of classroom testing to facilitate their performance, then we should attempt to find out how to do so. Conversely, if test anxiety is best handled outside of the testing situation, e.g., through counseling, then that is the approach which classroom teachers should use, and researchers in education and psychology should turn their attention to other matters.

It would seem that several well designed studies could be justified and could be beneficial.

The present study was designed to simultaneously examine the test anxiety influence and the immediate KR procedure in a field setting where course grades were at stake and typical classroom tests were used to assign these grades. The study had as one of its main purposes the psychometrically sound exploration of some theories about test anxiety, including Wine's (1971) notion of self-focus vs. task-focus, and whether provision of KR would serve as a task-focusing technique. In addition, the intent was to identify participant characteristics

such as level of test anxiety or GPA which might be correlated with preference for immediate KR. Throughout the study, care was taken to examine stumbling blocks which might make the process impractical from a mechanical, or undesirable from a psychological, point of view. All of these factors, included in a controlled field study, hopefully would produce information pertinent to the questions surrounding the influence of test anxiety on classroom achievement test performance.

REVIEW OF THE LITERATURE

Studies dealing with human learning and performance are many. Historically, feedback was utilized to facilitate learning. More recently it has also been utilized in an attempt to facilitate test taking. It is sometimes difficult to separate the two types of studies because they both use achievement test scores as the dependent variables. However, for purposes of the present review, attention will be focused primarily on research which deals with test performance because the researcher was studying the testing situation or the testee's reaction to it. Of course, these results are confounded with learning and also with scholastic aptitude/ability. Some researchers attempt to deal with these factors, some do not.

Studies have been abstracted from the published research in two major areas of education and psychology. These are, first, those pertaining to knowledge of results in the testing situation, and second, those pertaining to test anxiety as it has been related to achievement test scores. The scope and complexity of the theory and research from which each of these two topics come is extremely great.

It will be necessary to delineate a specific framework within which to examine each of them. Finally, an integrated summary will be presented which will lead to the purposes and hypotheses of the present study.

Knowledge of Results (KR)

The terms feedback, knowledge of results, reinforcement, correctional review, and knowledge of correct response can all be found in the literature dealing with the study of human learning and performance. Although the terms are often used interchangeably, Kulhavy (1977) has presented a helpful perspective in his review of the use of feedback in written instruction.

Kulhavy defines feedback in a generic sense as describing "...any of the numerous procedures that are used to tell a learner if an instructional response is right or wrong." (p. 211) In addition, he further suggests that if feedback is viewed as a unitary variable, then the process can range along a continuum from the simplest "Yes-No" format to complex new instruction. From this standpoint, immediate KR, as it is customarily employed in the testing situation, can be identified as being on the simplest end of the continuum. The present author has attempted to maintain this distinction.

Techniques for providing KR. In those instances where immediate KR is the feedback provided, answers to individual items are identified immediately as either correct or incorrect. These items may appear at the end of a small section of material as in programmed instruction, or take the form of unit quizzes or midquarter examinations.

There are currently four major ways in which to supply immediate

KR during testing situations. Three are basically pencil and paper devices, and the fourth is computerized testing. The pencil and paper devices are handled differently than the typical classroom answer sheet, and require that test items be multiple-choice, true-false, or matching in order to accommodate the correct-incorrect format of the provision of KR. Computerized tests can of course provide as much or as little KR as desired.

Punchboard-type devices involve the use of an answer sheet between two pieces of perforated material, the top containing slots for each alternative to each item and the bottom containing slots only for the correct answer in each case. The testee uses a stylus to select answers. Often the subject is instructed to continue to punch alternatives until the correct answer is found. The Pressey (1950) punchboard is an example of such a device, as is the Answer-Guard system used by Gray (1967), although the latter system was intended to prevent copying of answers in large group testing situations and was adapted to provide KR through the addition of a second color-coded sheet which showed a red spot when the correct answer was punched. One advantage of the Answer-Guard system is that both the experimental (KR) and control (no KR) groups use basically the same methodology for answering test items. Failure to control the mode of test response between testees receiving and not receiving immediate KR has been criticized by Betz and Weiss (1976a).

Another KR device uses answer sheets which require testees to erase the ink covering the selected alternative. A predetermined

code identifies the selection as correct or incorrect. Again, instructions often require the subject to continue to select until the correct answer is found. The Trainer-Tester (Montor, 1970) is an example of this method.

A similar KR device is the Action-Mark[1] system which was used in the present study. These answer sheets require the use of a special wax crayon to mark the selected alternative. Answer boxes appear blank, but when rubbed with a chemically treated wax crayon, a predetermined code appears which identifies the choices as correct or incorrect.

The latter two methods, although visually slightly different from a standard classroom answer sheet, require about the same effort to use. A minimum amount of practice is required, but with either method, answers cannot be changed as with a standard answer sheet. In instances where immediate KR answer sheets are used as testing devices, rather than in learning situations, this fact can be disconcerting to a testee and often increases the time needed to complete the test.

Interactive computer terminals constitute the fourth KR device, and can be programmed to supply as much or as little information as desired. Conceivably, Kulhavy's (1977) entire feedback continuum could be handled with this approach. The efficiency and speed of this method as a combination testing-immediate KR device is unparalleled; use will doubtless grow as researchers obtain funds for such facilities. Access to this method for classroom testing situations has

---

[1]Action-Mark is the trade name of 3M Company, Minneapolis, Minnesota.

increased, but it is still relatively expensive, and hence not as widely used as the pencil and paper methods for providing KR.

Problems in providing immediate KR. Betz and Weiss (1976a) have listed some major shortcomings which must be recognized in order to accurately assess the effects of immediate KR in reported studies. These include: 1) failure to control the medium of test administration and/or mode of test response, e.g., different amounts of time, effort or interest involved or unfamiliarity with testing equipment; 2) failure to control the characteristics of examinees, e.g., socio-economic or ability level; and 3) failure to control characteristics of the tests, e.g., cues obtained from previous test answers. In addition, these authors suggest that "quality of KR," or amount of positive feedback a subject obtains, may also be important if KR is being tested as a motivational factor.

Betz and Weiss (1976a) cite studies which failed to recognize one or more of these shortcomings, and whose results were therefore open to question. These studies were found to be primarily concerned with learning/retention rather than the effects of KR on the testing situation; only a limited number of studies were reported which studied effects of immediate KR on the testing situation.

Learning/Retention and KR. Kulhavy (1977) deals at length with studies using programmed instruction, as well as other methods, and concludes that immediate feedback is less effective for learning than is feedback which follows a 24-hour delay.

With regard to programmed instruction, Kulhavy warns that unless

care is taken, students are likely to learn only where to find the answer rather than the content area intended. He also emphasized the necessity for the learner's understanding the material to be learned, or knowledge of what must be done to correct erroneous responses, stating that "...feedback following wrong responses probably has the greatest positive effect." (p. 229) This notion of the differential effects (motivation?) of right and wrong answers is encountered repeatedly in the literature, and will be reviewed in turn. Although Kulhavy tends to discuss feedback of greater complexity than the Yes-No end of the continuum represented by immediate KR, his overall conclusion is that feedback facilitates learning.

McKeachie (1974) also has presented a review of feedback and learning, concentrating on reinforcement theory. Beginning with E. L. Thorndike's Laws of Learning first proposed in the early 1900's, McKeachie traces reinforcement to the present-day methods advocated by B. F. Skinner and his associates. Although he appears to view reinforcement as a subset of feedback, McKeachie apparently would be happy to relegate reinforcement theory to a small dark corner of learning theory, or at least reserve it for rats, and an occasional intelligent pigeon. McKeachie cites the facilitative effects of feedback on learning, although he doubts that reinforcement really operates in the same way or produces the same kind or degree of learning as does complex, delayed feedback. McKeachie seems to be relegating immediate KR to a category not unlike that called reinforcement.

Both of the above reviews have been concerned with test performance as a reflection of learning, where feedback varied from simple to complex. In other words, the treatment was administered prior to any test.

Test performance and KR. The use of feedback in the testing situation, which in this review is called immediate KR, or the Yes-No end of the continuum, has produced less consistent results than those reported from the literature on learning.

Bierbaum (1965) provided immediate KR to 23 subjects on two different classroom tests. Half of the subjects received KR on the first test; the other half on the second test. In each case those receiving KR used a Pressey-type punchboard, and were instructed to continue to select answers until the correct one was found.

Results suggested that those receiving KR made significantly more errors, and these subjects reported that the KR condition caused them to feel greater pressure.

Achievement tests were carefully constructed for use in a study by Strang and Rust (1973). They used two 25-item multiple-choice sequences, matched in difficulty, each of which contained twelve or thirteen items to assess areas wherein their subjects would be less likely to be certain as to the correctness of their answers. This was done to minimize subjects' intrinsic judgements of accuracy, which the authors felt could render the externally administered feedback valueless. In addition, no item was used which could serve a cueing function, i.e., offer information which could be used to answer any other item.

The first test (Part A) was presented to 153 undergraduate students as counting toward their course grade. After completion of Part A, subjects were sequentially assigned to one of four conditions on the second test (Part B). Half of the subjects received immediate KR and half did not. Within the KR-no KR condition, subjects were told either that this test counted toward their course grade or that it was an experimental exercise. Immediately after completion of Part B, all subjects were asked to rate their comparative nervousness on the two sequences. Completion times were recorded for both tests. Performance on Part A was used as a covariate in analyzing the scores on Part B. Completion time on Part A was used as a covariate in analyzing time spent on Part B. Immediate KR was supplied using sheets which required erasure of a black dot.

Results indicated that significantly more errors were made by all subjects who received immediate KR, and completion times were significantly longer for all subjects in the test condition. Further, a significant intereaction was found. The immediate KR group under test conditions had a significantly longer completion time than any other group, indicating that the two conditions together increased the time needed to complete the test. In addition, subjects indicated higher nervousness under the test condition, as did subjects who received immediate KR compared to those under the no-KR condition, although no interaction effect was found in this case.

Strang and Rust (1973) also checked for carry-over effect, both of immediate KR and the grade-no grade situation. Examining scores on the course final exam, they concluded that provision of immediate

KR had no effect on the subsequent test scores, but that the subjects under the no-grade instructions showed significantly inferior performance on the final. This result was attributed by the authors to subjects' disillusionment with part of the experimental procedure.

In a study of performance on mathematics achievement tests, Beeson (1973) provided immediate KR to items on the first half of seven 1-hour exams and a 2-hour final. His comparison group received the immediate KR to items on the second half of the same tests. Subjects were 45 college undergraduates and 30 junior high school students. The test items had been checked to prevent cues being obtained from the KR items. Results showed no significant differences between groups on any of the 1-hour exams, but the KR groups performed significantly better on the final exam. The author concluded that KR did not lessen student performance for any group; in fact, overall performance was slightly higher. He suggests that the finding of significant differences only on the final exam might be due to the fact that it was a longer, and hence more reliable, test.

Betz and Weiss (1976a) utilized both immediate KR and adaptive testing in administering ability test items to two groups of college undergraduates grouped by ability level. High-Ability (N = 239) and Low-Ability (N = 111) subjects were randomly assigned to immediate KR or no-KR condition within peaked conventional or "stradaptive" tests. Although all testing was done using an interactive computer system and cathode-ray terminals, the stradaptive approach branched examinees through nine difficulty levels using items calculated to be at or near

the ability level of each individual (Weiss, 1973). Maximum likelihood scores were calculated for both the stradaptive and the conventional tests in order to make valid comparisons between measurements utilizing different numbers or kinds of test items. Each subject also responded to several attitudinal items regarding reaction to immediate KR; and feelings of anxiety, motivation, and perceived difficulty following the testing period.

The authors reported significantly higher performance levels for all subjects receiving immediate KR, and score improvement was substantially greater for the conventional test for both High and Low Ability examinees when immediate KR was provided. On the stradaptive test, only the High-Ability subjects' score increase was statistically significant with KR. The authors emphasize that under KR conditions on the conventional test and under both KR and no-KR conditions on the stradaptive test, the mean performance of the Low-Ability group did not differ significantly from the means of the High-Ability group on either the conventional or stradaptive tests administered under no-KR conditions. Yet, High-Ability subjects did score higher than Low-Ability subjects on the conventional test given under no-KR conditions. In other words, for Low-Ability subjects, performance was enhanced either by immediate KR or by stradaptive testing, and thus either might be providing "incentive effects."

In a detailed examination of their attitudinal data, Betz and Weiss (1976b) elaborated on these incentive effects. They found that Low-Ability examinees reported significantly higher levels of test

taking motivation with adaptive testing, and also significantly more anxiety, especially in combination with immediate KR. However, these were the conditions under which performance was highest for this group. High-Ability examinees reported high levels of motivation for all conditions. In addition, ninety percent of all subjects were favorable toward receiving KR. The authors concluded that stradaptive testing more nearly allowed all subjects to perform to their fullest capability, and that immediate KR led to significant increases in test scores for the total group.

Betz and Weiss (1976b) suggested that positive KR, or immediate knowledge of correct responses, might be responsible for the increased motivation reported by their subjects. In stradaptive tests, the subjects were receiving items calculated to be at or near the ability level for each individual, and thus they might be receiving more positive KR, especially in the Low-Ability group, than customarily occurred in conventional peaked tests. In other words, Low-Ability subjects perceived themselves as "doing better" than on a conventional test.

It is reasonable to assume that testees always receive some feedback during testing. All learners get some test items correct, and they undoubtedly know it. Strang and Rust (1973) specifically constructed some items so that subjects could not receive this subjective feedback, but this certainly is not typical for most tests. Generally, investigators have not spoken to the possible effect of this subjective feedback and its influence on either test anxiety or motivation.

In other words, it is reasonable to assume that testees are always receiving some measure of feedback as to how well they are doing. If this is so, then provision of immediate KR might furnish new information or it might only confirm what the testee already suspected. The improved performance reported by Betz and Weiss (1976a) with stradaptive testing regardless of KR condition could have resulted partially from this more or less internal feedback system. Conventional tests, with their multiple levels of difficulty, might not permit as much confidence in subjective feedback.

Regarding the incentive effects of immediate KR, a laboratory-type study by Wade (1974) offered some interesting results. Thirty-two college undergraduates answered questions using programmed learning materials. The subjects were randomly assigned to groups which recorded correct responses, recorded incorrect responses, or received feedback but did not record. A control group received no feedback and did not record. Both groups which recorded had a significantly greater number of correct answers, but the mean number of responses for the recorded incorrect group was significantly higher than for the recorded correct group at the conclusion of the experiment. Both record-correct and record-incorrect groups reported significantly greater motivation. The proportion of correct answers was not significantly different in any group. In other words, performance levels (proportion correct) were the same, but those who were recording their responses evidently worked faster, although only those who were recording incorrect responses maintained their speed throughout the exercise. The generalizability of this study is

restricted, but the author suggests that perhaps nonoccurence of target responses is more motivating than their occurence. There is also evidence from the research literature on feedback in learning which supports the notion that incorrect responses have greater facilitative effect than correct responses (Kulhavy, 1977).

Another study which used a rather novel approach to examining the motivating effects of feedback was that by Ward and Prytula (1976). These authors had 35 advanced undergraduate and graduate students categorize and plot their errors from a multiple-choice test, after having been exposed to the usual oral post-test review and item discussion. The 40 members of the control group took part in the same review and discussion, but did not do the categorization. Subjects had been matched by similar test scores on the test and randomly assigned to experimental or control groups prior to the review. The five categories of errors also had been developed by a group of faculty and students prior to the review. The criterion measure of performance was the next classroom test.

Results indicated that the control group students performed significantly better than students who categorized and plotted their errors. The authors suggest that the experimental treatment might have interfered with some highly developed intrinsic feedback process already present in these experienced and obviously capable students.

Although several studies did report the repeated use of KR, usually on successive tests, the authors did not examine this aspect of its provision. Thus we cannot tell whether results would be different if KR was widely and repeatedly utilized.

Test Anxiety

The foregoing studies, dealing with the provision of immediate KR and its effect on the testing situation, did not specifically include test anxiety as a major variable, although some of them included self-reported feelings of anxiety. The usual method of including test anxiety involves using one of several instruments which have been developed specifically for the purpose of measuring anxiety in the testing situation, either directly (how did you feel during this test) or indirectly (how do you usually react on a test). These instruments will be discussed first, followed by the reports of several studies which utilized one or more of them, often in conjunction with some type of feedback, which was usually not immediate KR as it has been defined for purposes of this review.

Test anxiety and self-report scales. Test anxiety theory has developed in conjunction with instruments constructed to measure it.

The first instrument to measure anxiety specific to the testing situation was developed by Mandler and S. Sarason (1952), which they called the Test Anxiety Questionnaire (TAQ). These authors postulated the existence of two kinds of learned drives which are evoked during testing: learned task drives and learned anxiety drives. Within the latter were two classes of responses: those related to task completion, which reduce anxiety, and those which interfere with task completion. The TAQ was constructed to measure those learned anxiety drives which interfere with task completion.

Subsequently I. Sarason (1958) developed the Test Anxiety Scale (TAS) using 21 items from the TAQ. Correlation between the TAS and

the TAQ is .93 (Sarason, Pederson and Nyman, 1968).

The Achievement Anxiety Test (AAT) was developed by Alpert and Haber (1960) and consists of 10 items to measure "facilitative" anxiety (F Scale) and 9 items to measure "debilitating" anxiety (D Scale) plus 9 buffer items. These authors thus were measuring anxiety which they believed helped performance or at least was not harmful (facilitative), as well as anxiety which probably interfered with test performance (debilitating). This construct was, and remains, unique to the field of test anxiety, although Alpert and Haber presented considerable evidence to support their approach. The authors did not draw such a parallel, but the F Scale in some respects resembles the learned task drives of Mandler and S. Sarason (1952) and the D Scale could be compared to their learned anxiety drives. Alpert and Haber (1960) did report that in their studies the TAS correlated -.40 with their F Scale and .64 with their D Scale. The F and D Scales are negatively correlated with each other (-.48). Both the TAS and the AAT ask subjects to report how they generally react to test situations.

Speilberger, Gorsuch and Lushene (1970) constructed the State Trait Anxiety Inventory (STAI) which consists of two subscales. The A-state scale consists of 20 items and asks subjects to rate how they feel right now, and the A-trait scale consists of 20 items which refer to how a subject generally feels. The A-trait appears to reflect relatively stable anxiety-proneness, while the A-state has been shown to increase in response to stress.

Liebert and Morris (1967) selected items from the TAQ to develop 5-item Worry (W) and 5-item Emotionality (E) scales. The pattern of scores using the W and E scales resembles that of the A-state and A-trait scales.

The TAQ, and the scales adapted from it (the shorter TAS and the even shorter W and E scales) are all intended to measure test anxiety which is believed to interfere with test performance. Since the W and E scales consist of only 5 items each, they can be administered repeatedly in short periods of time.

The STAI was developed as a more general anxiety measure, in that the A-state scale can be used to assess any kind of stressful situation, including tests, while the A-trait scale provides a measure of more stable overall anxiety.

The Suinn (1969) Test Anxiety Behavior Scale (STABS) was developed for use in behavior therapy research, and consists of 50 items which correlate about .60 with the TAS.

All of these anxiety measures use somewhat different kinds of items. For example, the TAQ, the TAS, and the STAI items mention physiological responses such as sweating plams and noticeable heart-beat. The AAT scale items refer most often to feelings and how one handles them when faced with the testing situation, such as being able to concentrate or utilize material that was "crammed" just before a test. The instruments also vary in length.

The AAT was selected for use in the present study, primarily because it included the scale called facilitative anxiety, which

this researchers found intuitively appealing, and for which Alpert and Haber (1960) presented substantial evidence of construct validity. All of the test anxiety measures have evidence in support of the construct of harmful test anxiety. Two studies concerning the AAT as an instrument to measure test anxiety are included at this point.

Walsh, Engbretson and O'Brien (1968) demonstrated different levels of correlation between AAT scores and test performance as a function of sex. The original AAT comparisons were done on all male subjects, and Walsh et al. were able to demonstrate not only that AAT subscale means were sometimes significantly different for males and females, but also that they might be significantly different for different testing situations. These authors used two independent samples of approximately 100 subjects each, half males and half females, from undergraduate social science classes. Correlations between AAT subscales and the course exams were often significant and in the predicted direction, but these too varied by sex, and within sex for different exams. The authors concluded that the sex of the subjects could influence relationships, and that other variables operating at any given testing session could increase or decrease the relationships between anxiety and test-taking behavior.

An extremely interesting study involving psychometric properties of the AAT format was conducted by Huck and Jacko (1974). These authors determined that in at least four published studies, the AAT item response format had been changed from its original presentation by Alpert and Haber (1960), and yet each set of authors had stated that they used the AAT, with no mention made of the format changes.

In addition, the nine buffer items were sometimes omitted.

Accordingly, Huck and Jacko administered the AAT in its original format, complete with the nine buffer items, along with two different formats, both minus the buffer items, obtained from the authors in question. Each of the three versions were randomly assigned to 312 undergraduates in adolescent psychology classes. Prior to completing a form of the AAT, subjects rated themselves on a carefully defined scale of -5 to +5 as to whether test anxiety prevented them from doing well on tests or helped them achieve high exam scores. Separate one-way analysis of covariance tests, using the self-rating as the covariate, were run for F Scale, D Scale, and F Scale minus D Scale. The authors tested the within-group regression slopes prior to using the analysis of covariance and determined that there was sufficient homogeneity of slope.

Results indicated that there were significant differences among the three formats on all three scales of the AAT. Analysis revealed that the scores had different means, reliability estimates, and intraform correlations, and although the inclusion or exclusion of the buffer items was not specifically examined, changing the response format of the items did make a difference in the psychometric properties of the AAT. The study did not attempt to determine a "best" format, but rather to caution would-be investigators against changing a published instrument without so stating.

Test anxiety and performance. The TAS, the AAT, and the STAI, in particular, have been widely used in test anxiety research.

Spielberger, Anton and Bedell (1976) and Wine (1971) have reviewed and attempted to summarize this research. Generally, both reviewers state that high test anxious persons suffer a decrement in test performance in evaluative situations.

Wine (1971) has attempted to locate some degree of causality, and believes that the literature suggests that:

> "(a) highly anxious persons are generally more self-preoccupied than are people low in anxiety;
>
> (b) the self-focusing tendencies of highly test-anxious persons are activated in testing situations;
>
> (c) those situational conditions in which the greatest performance differences occur are ones which elicit the self-focusing tendencies of highly test-anxious subjects, and the task-focusing tendencies of low-anxious subjects;
>
> (d) research examining the relationship between anxiety and task variables suggests that anxiety reduces the range of task cues utilized in performance;. . ."
>
> (Wine, 1971, p. 92)

Wine cites evidence from a pilot study which she conducted which indicated that behavioral methods designed to focus the attention of test anxious persons on task requirements might be effective in improving their performance.

Looking particularly at the treatment literature, Speilberger et al. (1976) concluded that while desensitization and relaxation treatments appear to be effective in reducing anxiety, improved performance on intellectual-cognitive tasks occurred only when some form of a study-skills counseling was also included. Study skills could, in fact, be a form of task focus, and although training would occur prior to the situation to which Wine seems to be referring, its

effects surely would be present during testing.

Test anxiety and ability. In developing the AAT, Alpert and Haber (1960) addressed the question of the relationship between anxiety and aptitude, ". . . because interest is centered in a scale which predicts performance variance attributable to something other than aptitude." (Alpert and Haber, 1960, p. 210). In a series of studies which predicted GPA and/or final examination grades from a combination of aptitude and anxiety, Alpert and Haber concluded that the AAT was able to account for added variance in academic performance. They state, however,

> "This does not mean to say that these anxiety instruments are not, in part, measures of intellectual ability. . ."
>
> (Alpert and Haber, 1960, p. 211)

S. Sarason, Davidson, Lighthall, Waite and Ruebush, (1960) addressed the same issue and came to somewhat similar conclusions. These authors noted that even in studies where intelligence was controlled by matching subjects, there were still differences in learning rate between high-anxious and low-anxious groups, and it was therefore anxiety level and not I.Q. that was responsible for the negative relationship. They further state:

> ". . . it does seem reasonable that different abilities may determine how much can be demanded of a given individual before his anxiety feelings function to depress his performance. Similarly, different levels of anxiety may determine just how insecure the learning situation can become without provoking task-irrelevant responses which will successfully compete with task-relevant responses, with the same debilitating result."
>
> (S. Sarason, et al., 1960, p. 10)

Although S. Sarason, et al., specifically refer to learning, both

authors seem to be suggesting that, over and above ability, test anxiety influences performance. Researchers in the area of test anxiety and test performance have largely ignored the ability/anxiety issue, with one exception.

Boor (1972) administered the TAS, the AAT, and the Wechsler Adult Intelligence Scales (WAIS) Information and Vocabulary subtest to 55 male and 61 female undergraduates three weeks prior to the end of the grading period in a university introductory psychology course. These scores were then correlated with the total points earned in the psychology course.

Results indicated that the anxiety measures correlated significantly with the intelligence measure, and when variance attributable to intelligence was partialled out, all of the resulting partial correlations were nonsignificant, $p \geq .30$. Furthermore, there was no significant relationship between sex and either intelligence or academic performance. Boor (1972) concluded that, although Alpert and Haber (1960) found that their AAT was able to account for added variance, his study suggests that this is not always the case.

Although the issue is scarcely resolved, there are many researchers who seem to prefer to identify a practical method for facilitating test performance rather than determining why performance could be less than optimal. In fact, most of the studies cited in this review seem to have opted for investigation of various applied methods, of which feedback, including immediate KR, is one.

Test anxiety and test items. The work of Munz and associates

(Munz and Smouse, 1968; Sweeney, Smouse, Rupiper and Munz, 1970; Munz, Costello and Korabik, 1975) has taken a slightly different, yet pertinent, approach.

After reviewing the notion that an arrangement of test items in an easy-to-hard difficulty sequence decreases test taking anxiety, thereby facilitating performance, Munz and Smouse (1968) state that there has been no empirical justification found for such a practice, at least using group measures. They therefore tested for the differential effects of test anxiety, using the AAT, and three item difficulty sequences: easy-to-hard (E-H), hard-to-easy (H-E), and random (R), using achievement test scores as the dependent variable. They categorized the AAT scores as high F Scale, called Facilitators; high D Scale, Debilitators; high F Scale and high D Scale, High Affecteds; and low F Scale and low D Scale, Non-Affecteds. Their hypothesis included predictions that Debilitators would perform significantly better on the E-H item sequence and that Facilitators would perform better on the H-E item sequence. Subjects were 120 male and female college undergraduates.

Results were not as expected, but were nonetheless interesting, and as a result the authors reformulated their thinking, and plotted their results in the form of the inverted-U, an hypothesis which states that behavioral efficiency varies as a curvilinear function of arousal, and that there is a degree of arousal which is optimal for performing a given task (Munz and Smouse, 1968, p. 373).

Under condition of random difficulty item sequencing, then, with level of arousal on the horizontal axis and mean performance

score on the vertical, the plot of Munz and Smouse's (1968) results looked like an inverted-U (see Figure 2, p. 68 in Analysis and Results). Facilitators and Most Affecteds were at the top of the curve, with Non-Affecteds on the bottom left and Debilitators on the bottom right. This work has since been replicated and further tested (Cf Sweeney, et al., 1970). However, in reporting later work, Munz, et al. (1975) stated that the High-Affected category had been excluded since previous research had yielded "inconsistent and incomprehensible" results (p. 40). This particular work was either not published or not found.

The method of these authors for categorizing anxiety types from AAT scores is related to the High-Low categorization of other authors using another instrument, such as the TAS, but the performance levels do not necessarily correspond. Generally, the relationships are as follows:

AAT Scores	Typical Performance	TAS Scores	Typical Performance
Most Affected	high		
Facilitators	high	High	low
Debilitators	low		
Least Affected	low	Low	high

The first three categories of AAT scores are all assumed to have high test anxiety, although Facilitators are benefited by theirs, Debilitators are harmed, and Most Affecteds have high levels of both. Only Least Affecteds have low levels of test anxiety, of either kind. Thus, it is apparent that although high test anxiety levels are

usually thought of as detrimental to performance and low levels are not, when speaking of AAT scores this might not be the case.

Test anxiety and feedback. McMahon (1973) hypothesized that college freshmen who had detailed feedback regarding their SCAT scores would attain a higher GPA for the semester and have lower test anxiety at final exam time. Subjects were randomly selected from courses in speech, history, and psychology (N = 222). The SCAT was administered during the second week of the semester, and randomly assigned subjects received written communication giving either a detailed written interpretation of their score plus a prediction of likely GPA for the semester, or a brief report of their score. A third group received no communication. All groups were administered the TAS.

Analysis of end-of-semester GPA's showed no significant differences, and the test anxiety level was higher for the detailed knowledge group. The author suggested that the results could have been influenced by the time lag between the feedback and the final exams, and also that the feedback was provided by mail rather than face to face.

Osterhouse (1975) chose to examine more subtle kinds of feedback, i.e., unidentified variables which might be associated with different classrooms which cause the levels of anxiety to vary. Two sections of undergraduate psychology students, taught by two instructors, served as subjects. The author's Inventory of Test Anxiety, a 16-item self-report measure with high reliability estimates, was administered during

the first class session and immediately following each of three course exams. Low, high and moderate anxiety subjects were identified on the basis of the first test administration. The author then selected equal numbers from each section having scores that were lowest, highest, or closest to the mean of each course exam. The dependent variable was average T-scores representing exam performance for the entire semester.

There was a significant difference in anxiety level between the two sections. When differences in anxiety level were not considered, a significant negative linear trend was identified between anxiety and performance. The performance of low anxiety subjects did not differ between sections, but the performance of moderate and high anxiety subjects varied as a function of section, with high anxiety subjects tending to obtain slightly higher scores in the low anxiety section. The author further concluded that results provided more support for the position that anxiety is linearly related to performance than that the relationship is curvilinear as hypothesized in the work of Munz and associates. He also noted that since a high level of classroom anxiety appeared to debilitate the performance of high test anxiety subjects, future research needs to examine instructor, classroom management, and examination variables that contribute to differences in mean level of classroom test anxiety.

Morris and Fulmer (1976) presented results from ongoing work with the worry-emotionality construct using the W and E items of Liebert and Morris (1967), who first distinguished between cognitive

(conscious concern, negative expectation, fear of consequences) and emotional (physiological-affective, autonomic arousal) components of test anxiety.

In a first study, Morris and Fulmer (1976) randomly selected undergraduates to receive item by item KR (N = 20) or no KR (N = 35). The two groups were in separate rooms, but both had been instructed that their course grade would not be affected. The W-E items were administered before and again after testing. The hypothesis was that emotionality scores would decrease from preexam to postexam regardless of KR condition, but that worry scores would decrease only in the KR condition. Results were as predicted.

In a second study, the same authors randomly assigned 144 undergraduates to three test-importance conditions (regular exam which could help or hurt course grade, exam which could only improve course grade, or no effect) and three testing methods (immediate KR, no KR but using the same mechanism, and no KR on standard answer sheets). Subjects were asked to respond to the W-E items before, halfway through, and following the exam. Results were not as clear-cut in the second study.

The high test importance group had significantly higher worry scores and also higher emotionality scores, with the KR condition causing both to increase from pre-test to post-test, and the no-KR condition causing both to increase from pre-test to mid-test. Since both W and E scores were affected, the authors allowed that the distinction between the two might not be as strong as had previously

been supposed when course grade was not involved. Further, provision of KR did not decrease either kind of anxiety during testing, as it had done in the first study. Results were nonsignificant for the low test importance group, and the moderate test-importance group had significant results only in one KR condition.

Morris and Fulmer (1976) concluded that test importance can be a major variable, particularly in conjunction with KR, for both worry and emotionality as they have previously defined these constructs.

If subjects with high levels of test anxiety of the debilitating kind do perform less well on tests of achievement, does this constitute negative feedback? If it does, then reinforcement theory would suggest that such subjects would try to avoid these situations. This idea was examined in work reported by Janisse (1973). Subjects were offered a choice of final evaluation formats: the traditional test, an oral exam with the course instructor, or a 6-10 page typed essay. Choices were made after eight weeks, and the author reported that all subjects chose the traditional test 3.5 to 1, but that those with high test anxiety tended to choose the non-traditional format. He further suggested that the restricted time of the traditional test may work to the advantage of the low test anxious student.

Questions surrounding the effects of test anxiety on performance are far from answered; in fact, this review of the literature seems to suggest that, while much is suspected, little is really known.

Summary

Research dealing with the provision of feedback or immediate knowledge of results (KR) tends to deal with its effect on learning,

rather than with its provision only during testing. Those studies which examined achievement test performance from the standpoint of the testing situation and provision of KR are few, and did not control for test anxiety. Two studies reported that immediate KR increased errors, self-reported nervousness, and length of time utilized to complete the test (Bierbaum, 1965; Strang and Rust, 1973); one study reported significantly higher performance with KR (Betz and Weiss, 1976a) and one reported that KR improved performance, but not significantly so (Beeson, 1973).

Test anxiety research, on the other hand, usually does not include the provision of KR. Studies of test anxiety are much more numerous, but difficult to summarize, in that several instruments to measure test anxiety have been developed and utilized. Although correlated, these measures come from slightly different theories and the designs which use them are often dissimilar.

A further complication is the fact that test anxiety measures are correlated with measures of scholastic aptitude/ability, but researchers do not necessarily take this fact into account. Many studies of test anxiety have demonstrated different levels of test performance which their authors attributed to different levels of test anxiety. For example, high test anxiety usually refers to debilitating anxiety, and several authors have reported that subjects with high test anxiety have lower performance on achievement tests than those with low test anxiety. (Wine, 1971; Spielberger, et al., 1976).

However, Boor (1972) demonstrated that a measure of ability could explain the significant variance associated with performance at

different levels of test anxiety. It is possible that ability, and not test anxiety, is the variable of interest. It would be extremely easy, at this point, to become involved in a chicken-or-egg type of argument.

Although Morris and Fulmer (1976) did provide KR, they were interested in the differences of test anxiety at the beginning, middle, and end of the testing period. They concluded that provision of KR caused test anxiety to remain high throughout, particularly when test results were to be included in a course grade.

Betz and Weiss (1976a) were interested in performance on ability tests, and did control for ability level but not for test anxiety. They concluded that provision of KR improved performance on their items, especially on their conventional test, and particularly for low ability subjects. No course grade was involved in this study, since the authors did not work with classroom achievement testing.

Also of note is one study which concluded that subjects monitoring their incorrect responses apparently were more motivated than subjects who monitored their correct responses (Wade, 1974). The possibility that different individual levels of test anxiety might interact with general level of anxiety in a classroom (Osterhouse, 1975) serves to further emphasize the very real complexity of variables which need to be considered in the area of test anxiety and performance.

However, if it is primarily a method we are after, one which will facilitate the achievement test performance of testees who could do better, then it is well to study approaches which might cause high

anxiety subjects to "focus on the task" (Wine, 1971). The present study is an attempt to determine whether or not provision of immediate KR might serve this purpose.

PURPOSE AND HYPOTHESES

The purpose of this study was to investigate the effects of provision of immediate knowledge of results (KR) during testing in a typical classroom situation.

More specifically, the study was concerned with whether test achievement would vary among examinees at four test anxiety levels, as reported in the literature, when immediate KR was provided on an item by item basis during the test. Of paramount interest was whether those students at anxiety levels which typically show low test achievement would increase their test scores when provided with immediate KR during testing. Although provision of immediate KR during computerized testing has been shown to significantly increase performance of low ability examinees on an ability test (Betz and Weiss, 1976a), these effects apparently have not been investigated using a pencil and paper technique on an achievement test. Further, the only study found which examined test anxiety levels in conjunction with immediate KR in the testing situation itself was concerned with the influence of KR on test anxiety, not performance.

A second purpose was to identify possible examinee characteristics which might be associated with liking for and choice of immediate KR during testing, in order to suggest possible applications for the use of immediate KR in the classroom testing environment.

Finally, three areas of investigation were integrated into the design in order to examine two promising theories and one serious shortcoming found in the current literature. First, several test anxiety items were constructed for use in addition to the F Scale and D Scale of the Achievement Anxiety Test (AAT), based on a suggestion by Wine (1971). These items were constructed to refer to self-focus concerns (SF Scale), such as worry about how others were performing on the test, or how others might react to one's own performance. For example, one such item was "During a test I get very concerned that I must perform as well as everybody else or they will think that I'm dumb." A complete listing of items is given in Table 18 (p. 103, in Analysis and Results).

Second, another method of grouping subjects using the AAT scores was developed as an alternative to that reported in the literature (Munz and Smouse, 1968). This procedure became intuitively apparent when it could be seen that the Munz and Smouse methodology was not adequately differentiating between subjects who scored high on both the F Scale and the D Scale as opposed to those who scored high on one scale but not on the other.

Third, the classroom test reliabilities (internal consistency) were examined for the complete tests and after revision, wherein

selected items were deleted in an attempt to increase test homogeneity. This could not be accomplished prior to the start of the study, and hence utilizes the same set of scores as the other data analyses of the study.

The research was designed to test the following specific hypotheses:

Hypothesis #1. The achievement scores of those students who receive immediate KR will be significantly higher ($p \leq .05$) than the achievement scores of those who do not receive immediate KR, regardless of anxiety category.
Null Hypothesis. No difference between treatment groups.

Hypothesis #2. The achievement scores of those students categorized as Facilitators and Most Affecteds will be significantly higher ($p \leq .05$) than students categorized as Debilitators and Least Affecteds, regardless of treatment condition.
Null Hypothesis. No difference between anxiety categories.

Hypothesis #3. There will be a significant interaction ($p \leq .05$) between immediate KR and anxiety category, as follows:

Hypothesis 3a. Students characterized as Debilitators and Least Affecteds under the condition of immediate KR will achieve higher scores than their counterparts in the Control Group who do not receive immediate KR.

Hypothesis 3b. Students characterized as Facilitators and Most Affecteds under the condition of immediate KR will achieve the same as their counterparts in the Control Group who do not receive immediate KR.

Null Hypothesis. No interaction between treatment group and anxiety category.

Hypothesis #4. When cell-means are adjusted for self-reported GPA, there will be no significant differences between treatment groups and anxiety categories, and no significant interaction.
Null Hypothesis. No significant effect ($p \leq .05$) due to self-reported GPA.

The directional nature of the hypotheses was suggested by results reported in the literature, and is associated with the major purpose of the study. Although there were no specific hypotheses associated with the explorative purposes of the study, the following tentative assumptions more or less guided their implementation:

1) Differences in background, such as year in school, previous coursework in the subject matter, GPA, etc., might be associated with test anxiety scores, reaction to receiving immediate KR, and/or choice to receive KR on the last course exam.

2) Differences in previous experience with KR might be associated with reaction to KR on a test, and/or choice to receive KR on the last test.

3) If provision of KR affected test performance, then subjects who received higher test scores when receiving KR should choose to receive it on the last course exam.

4) If provision of KR did serve to focus attention to the task, then highly test anxious subjects might choose to receive KR on the last course exam to a greater extent than less test anxious subjects.

5) Choosing to receive KR on the last course exam might not necessarily be strongly associated with <u>liking</u> for provision of KR, since other authors have reported that subjects often express feelings of increased anxiety from provision of KR.

6) The variant of the Munz and Smouse (1968) method of anxiety categorization used in the present study should produce more homogeneity of scores within a category, and hence decrease variance within cells in the analysis of variance tests.

7) The internal consistency of the classroom tests should be considered because it may provide some insights into the results which are obtained from the other data analyses.

All of the above hypotheses, and less formal assumptions, were considered in the design of the study and the analysis of the data which resulted.

METHODOLOGY

This study was conducted using college undergraduates registered in two sections of an elementary nutrition course taught by separate instructors using the same course materials, and three non-overlapping achievement tests. Information on background characteristics, previous experience with immediate KR in testing situations and measures of test anxiety were collected. Subjects were randomly assigned to a group which received immediate KR on Test 1, a group which received immediate KR on Test 2, or a control group. Immediate KR was provided using Action-Mark answer sheets. For the third test, the first two groups were allowed to choose whether they wished to receive immediate KR; the control group utilized the customary machine scored answer sheets throughout.

After receiving immediate KR on one or the other of the first two tests, subjects responded to seven items designed to assess reaction to its provision. Following the third test, all participants responded to a series of ten items designed to assess feeling of anxiety, motivation, and perceived difficulty of the test.

The experimental data consisted of the achievement test scores of four anxiety levels as influenced by receiving or not receiving immediate KR. The correlational analyses examined whether background characteristics, previous experience with immediate KR, anxiety level or achievement scores were related to liking for or choice of immediate KR.

Design

The experimental part of the study utilized a randomized block analysis of variance with two independent variables (Kirk, 1959).

Independent variables. The blocking variable was anxiety category based on scores from the Achievement Anxiety Test (AAT) of Alpert and Haber (1960). Within each of the four resulting categories, subjects were randomly assigned to one of three treatments: Group 1 took Test 1 using an answer sheet which provided immediate KR and Test 2 using the standard no KR answer sheet; Group 2 took Test 2 using an answer sheet which provided immediate KR and Test 1 using the standard no KR answer sheet; Group 3, the control group, used the standard no KR answer sheet throughout. These treatment groups will be referred to as Groups 1, 2 and 3, respectively, throughout this report. Figure 1 graphically displays the experimental design of the study.

Dependent variables. The primary dependent variable of interest was the test scores on the classroom achievement tests. Because all of the tests covered different content areas, and because the researcher was not willing to assume that the students would react in the same fashion to the initial course exam as they would to a sub-

		TREATMENT GROUP			
		1 KR on Test 1 No KR on Test 2 Choice on Test 3	2 No KR on Test 1 KR on Test 2 Choice on Test 3	3 Control No KR on Any Test No Choice on Test 3	
					TOTAL
ANXIETY	Most Affecteds	N = 6	N = 6	N = 6	18
	Facilitators	N = 7	N = 8	N = 7	22
	Debilitators	N = 7	N = 7	N = 6	20
	Least Affecteds	N = 7†	N = 6	N = 6	18
	TOTAL	26	27	25	79†

†One participant dropped the class following the first test.

Figure 1. Experimental design of the study.

sequent course exam, the two sets of test scores were not analyzed simultaneously.

Reaction to the provision of immediate KR was also a dependent variable of interest. Those participants who received immediate KR were asked to respond to seven items concerning their reaction to its provision.

A third dependent variable was choice of type of answer sheet to be used for the last course exam, Test 3. Those participants who had previously received immediate KR were eligible to choose either the immediate KR or the no KR answer sheet. The control group did not choose.

A final set of dependent variables was the responses of all participants to ten items administered following Test 3. Three items were intended to assess anxiety, three referred to motivation, and four concerned perceived test difficulty.

Secondary Analyses

The present study incorporated three additional investigations.

First, because much of the published literature does not address the question of reliability estimates for the instrument(s) from which the researcher derives the scores which constitute the major dependent variable, the present study attempted to examine this area.

Second, the methodology for assigning subjects to an anxiety category, based on one of the published test anxiety scales, is highly variable. It was decided to compare two possible groupings, that developed by Munz and Smouse (1968) and a variant of that procedure

developed by the researcher.

Lastly, research which involves human subjects now customarily requires approval by an outside committee which can impose certain procedures to safeguard rights of participants. The present study included an investigation of possible sample bias resulting from requirements mandated by the Committee on the Use of Human Subjects in Research at the University of Minnesota.

Procedure

Subjects. Participants were students registered in two sections of a class in normal nutrition, offered yearly, at the College of St. Benedict in St. Joseph, Minnesota.

The author met with the students in each section during the second class session. All procedures were carefully explained and individually signed consent forms were obtained from those who were willing to participate. A copy of the consent form is included in Appendix A.

At the same meeting, both participants and non-participants were requested to complete a background data sheet, a fact sheet on previous experience with immediate KR during testing, and the Achievement Anxiety Test (Alpert and Haber, 1960). Subjects not present at that class session were treated as non-participants.

It should be emphasized that although the participant's reactions would be anonymous to the researcher and any subsequent readers of the study results, including the classroom instructors, all subjects were aware that the results of the classroom tests would be used to

assign grades in the course.

Test administration. The achievement tests were administered after 8, 13 and 18 lectures during the regular class period. The tests customarily required one hour to complete; students were informed that they could take extra time if they needed to do so. Both the instructor and the author were present. At the start of each test, each student received a copy of the test questions and an appropriate answer sheet. Non-participants received the same answer sheet as students who did not use the experimental immediate KR answer sheet for that particular test. Following use of the immediate KR answer sheet, students were asked to complete the seven-item questionnaire concerning reactions to the provision of KR.

Experimental answer sheets were checked and scored by the researcher and returned to each instructor. All test results were discussed by the instructors and students at a subsequent class meeting. Any questions regarding matters other than answers to the test items were referred to the researcher, who discussed them at a later class.

Midway between Test 2 and Test 3, participants were requested to select their preferred answer sheet for use on Test 3. That is, those who had received immediate KR either on Test 1 or on Test 2 could select the immediate KR answer sheet or the customary answer sheet. Members of the control group were requested to react to two items concerning the test questions in the course.

Following the administration of Test 3, all participants were asked to complete the reaction questionnaire of ten items concerning

feelings of anxiety, motivation, and perceived difficulty of the test.

Instruments

Classroom achievement tests. One course instructor had previously constructed three non-overlapping objective achievement tests. Each test consisted of about eighty-five multiple-choice and true-false items, and about fifteen short answer items, giving a total score of one hundred points. The multiple-choice and true-false items customarily were answered on a standard machine-scored sheet; the short answer items were individually scored by the instructors. The previous year's test items were re-used; they had undergone revision by the instructors from year to year, but had never been subjected to formal item analysis procedures.

At the start of the study, one instructor and the author attempted to revise test items on which knowledge of a correct answer could furnish information concerning the correct answer to any other item. This step was essential to insure that achievement scores in the study not be differentially inflated for those students who used the experimental answer sheet which provided immediate knowledge of results (KR). The same instructor double-checked each item for clarity and provided a key giving the correct answer.

Using only the multiple-choice and true-false items, special answer sheets for each test were prepared and ordered from the producers of the Action-Mark process. The finished answer sheets contained visible printing which included a code identifying for which test the answer sheet was to be used, instructions, one trial

question, and what appeared to be blank boxes in which to mark answers. When the answer boxes were rubbed with a special wax crayon, the latent printing became visible, indicating a correct or an incorrect answer. A copy of an answer sheet is included in Appendix A.

Achievement Anxiety Test (AAT). The original items and format of the AAT were obtained through personal communication with the first author of the study which reported examination of the AAT formats (Huck and Jacko, 1974). Facilitating (F Scale) and debilitating (D Scale) anxiety items plus four of the buffer items were used as written, and presented in the order given. Five additional items were constructed and substituted for the remainder of the buffer items. These items were intended to reflect a worry or self-focus concern, in line with suggestions by Wine (1971). The four original buffer items which were used also seemed to fit the self-focus concern, and the nine items together became a Self-Focus Scale (SF Scale).

A copy of the AAT as it was used in the present study is presented in Appendix A. The items specifically constructed for the SF Scale are numbers 4, 7, 13, 20, and 22. Numbers 8, 25, 27 and 28 are the original buffer items which were included in SF Scale.

Demographic data and reaction questionnaires. Data were collected regarding GPA, major, year in school, sex, number of hours of nutrition coursework previously completed, and whether this course was required or elective. All students were also asked how many times, if ever, they had received immediate feedback on a test, and whether they thought they would like to take a test which provided

immediate feedback. "Feedback" rather than "immediate KR" was used because it was felt that students would be more familiar with this term.

The seven items used to assess subject reaction to provisions of immediate KR, and the ten items concerning reaction to Test 3, were items previously used by Betz and Weiss (1976b). These questionnaires are shown in Appendix A.

The choice of format sheet, used prior to Test 3, and the two questions regarding the course exams which were presented to the Control group at that time, also are shown in Appendix A.

Anxiety categories. AAT scores of the participants were categorized using the procedure of Munz and Smouse (1968) as follows: (Differing numbers of subjects in each category resulted from score ties, as explained below.)

1) D Scale scores were subtracted from F Scale scores for each subject (FMINSD). The highest 22 scores and the lowest 17 scores were removed and designated Facilitators and Debilitators, respectively.
2) For the remaining subjects, F Scale and D Scale scores were summed (FPLUSD).
3) The lowest 17 scores were designated Non-Affecteds.

The authors state that results using a High Affecteds category (high FPLUSD scores) have been inconsistent and incomprehensible, and they no longer use such a category (Munz et al., 1975, p. 40).

Two problems become apparent in attempting to use this procedure.

First, in order to obtain sufficient power for the analysis of variance, 6-8 observations in each of the twelve cells were required (See Figure 1). This necessitated that all willing subjects be included. Identical FMINSD or FPLUSD scores were assigned to the same category, but nothing could be done about the fact that scores differing by only one point were sometimes assigned to a different category.

The second problem, however, was amenable to solution. It is obvious that when both F Scale and D Scale scores are close in value, subtracting one from the other will result in FMINSD's close to zero. Yet, the subjects are theoretically different in test anxiety type. In fact, when both scales are high, subjects would hardly be Non-Affecteds, yet they might be so classified by the Munz and Smouse procedure. The solution would be to remove these types first, which could be accomplished by summing scores, then subtracting rather than the other way around. This procedure could be particularly important when all subjects were being used, as in the present case.

Accordingly, a variant of Munz and Smouse's (1968) procedure was developed by using the following method: (Again, differing numbers of subjects in each category resulted from score ties.)

1) F Scale and D Scale scores were summed for each subject (FPLUSD). The highest 18 scores were removed and designated Most Affecteds.
2) For the remaining subjects, D Scale scores were subtracted from F Scale scores (FMINSD).

3) The highest 22 and the lowest 19 scores were designated Facilitators and Least Affecteds, respectively.

4) The remaining 20 subjects were designated Debilitators.

This latter anxiety categorization was called ANXF, and the former (Munz and Smouse) was called ANXM.

Subjects from each of the four ANXF categories were then randomly assigned to one of three treatment groups: Immediate KR on Test 1 but not on Test 2, Immediate KR on Test 2 but not on Test 1, or Control. These groups hereafter will be referred to as Groups 1, 2 and 3, respectively.

Data Analysis

All data analyses, except where noted, utilized subprograms of the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner and Bent, 1975).

Analysis of effects of immediate KR and test anxiety on achievement test performance. Scores on each of the first two classroom tests were used as the dependent variables in two-way analyses of variance using the four ANXF or the three ANXM categories and the three treatment groups, to examine differences in achievement attributable to anxiety category and/or provision of immediate KR. Additional analyses of variance were run using the revised test scores on Test 1 (working with revised reliability estimates) to examine possible influence of test internal consistency. The computations followed the "classic experimental" method described by Nie, et al. (1975, pp. 405-408). Where overall F test showed $p \leq .10$, subgroup means were compared using

Scheffe's (1959) method. A 4x3 analysis of covariance was also run with self-reported GPA as the covariate. Intercorrelations among the variables of the analysis of covariance utilized Pearson product moment correlations.

Analysis of response characteristics. Chi-square tests of independence were used to examine relationships between response data (reaction to provision of immediate KR, choice of answer sheet for Test 3, and reaction to the ten-item questionnaire following Test 3) and testee characteristics (background data, previous experience with immediate KR, and anxiety category).

Pearson product moment correlations were calculated between response data and self-reported GPA and test scores, and among the item responses. The question of carryover effects of KR was assessed by comparison of group mean performance as calculated in the analysis of variance.

Responses to the motivational, anxiety, and perceived difficulty items collected following Test 3 were analyzed using one-way analysis of variance to examine group mean differences in response. Pearson product moment correlations were calculated between response data and test scores, and among the item responses.

Analysis of SF Scale items. Means and standard deviations were obtained for items and the entire scale, and Coefficient Alpha was calculated for the scale, in order to examine individual and collective performance of the specially constructed items.

Chi-square tests of independence were run between SF Scale items

and background data, previous experience with immediate KR, and anxiety category. Pearson product moment correlations were run between the SF Scale and the other two scales of the AAT (F Scale and D Scale), and also between the SF Scale and self-reported GPA and test scores, to determine whether the SF Scale measured a different aspect of test anxiety or was related differently to measures of achievement.

Analysis of test internal consistency estimates. There was no prior information available concerning the reliability of the three achievement tests. Following test administration during the study, item analysis data and KR_{20} reliability estimates were obtained for the multiple-choice and true-false items (Item 66, 1976). Since KR_{20} estimates are a subset of Coefficient Alpha, this measure of internal consistency can also be viewed as the average of all possible split-half reliabilities (Cronbach, 1951). Although this type of reliability estimate does not speak to the stability of the achievement tests, it does provide some information regarding how the testees reacted to the test items. In addition, each test was re-analyzed after selective deletion of items which were negatively discriminating and/or which had extremely low point-biserial correlations with the total test scores. Deletion was arbitrarily halted when the number of items in a test dropped to fifty, or when the KR_{20} estimates decreased instead of increasing, whichever occurred first.

Item deletion has been severely criticized by proponents of criterion-referenced measurement because it tampers with possibly important test content (Popham, 1978). In the present study, test

scores resulting from the more homogeneous subset of test items were compared with the original sets of scores, when each was used as the dependent variable in analysis of variance. This was done for the purpose of examining whether differing results would occur, and if so, what these results might suggest. It was recognized that these results were sample specific and were only suggestive.

Comparison of anxiety categories. Means and standard deviations for the four ANXF categories and the three ANXM categories were calculated and compared visually. Since the two sets of categories contained primarily the same subjects, statistical comparisons between the two were not attempted. However, these two categorizations were used in separate analysis of variance calculations for the purpose of comparing results.

Analysis of sample bias. Background data, previous experience with immediate KR, and AAT scores were compared for participants and non-participants. Two-sample t-tests were run on the three scales of the AAT. Other variables were analyzed using chi-square tests for independent populations. These analyses were used to determine whether the informed consent procedures resulted in any discernible self-selection bias in the study population as compared to the total class registration.

ANALYSIS AND RESULTS

Because of their possible impact on study results, two factors will be discussed first: (1) whether the study sample was biased by the necessity of obtaining individual signed consent as required by the Committee on Use of Human Subjects in Research, and (2) the reliability of the scores of the classroom achievement tests, insofar as this could be determined from the internal consistency estimates.

The major results of the study will be reported in subsequent sections: (3) the effects of immediate knowledge of results and test anxiety on test performance, and (4) the responses of the participants to immediate KR. Included with the former will be an evaluation of the different methods of assigning subjects to anxiety categories.

Finally, the remaining topics will be presented: (5) considerations in providing immediate KR on pencil and paper tests, and (6) characteristics of the Self Focus scale developed for this study.

Possible Sample Bias

There were a total of 104 registrants for the two class sections. Twelve students were not present at the second class meeting when the

study was described and consent forms were signed. The course instructors felt that additional class time could not be used, but both briefly mentioned the study and offered forms at the third class meeting. There was no response from the remaining twelve students. Individual contact was not feasible. The twelve students were therefore treated as non-participants during the study, and will be referred to as unidentified registrants. They did not complete the background data questionnaires or the Achievement Anxiety Test (AAT) and no characteristics can be ascribed to them.

The Population. Background information for the remaining 92 students is presented in Table 1. Examination showed that only nine subjects were other than nursing students, only six had had previous coursework pertaining to nutrition, and only six were males. These three variables were therefore not considered in subsequent data analyses, and generalizability of the results was also further restricted than previously had been anticipated.

In general, identified registrants were primarily female nursing students almost equally divided between the sophomore and junior years with no past coursework in nutrition. The course was a requirement for approximately two-thirds of the 92 respondents. The self-reported GPA was quite high, with 32 percent of the group reporting their GPA to be 3.5 or higher on a 4.0 basis. Seventy-eight percent had not had a previous experience with receiving immediate KR in a testing situation. Approximately 65 percent thought they would like such an

TABLE 1

Summary Characteristics of Identified Class Registrants†

Characteristic	Participants N=79 N	%	Non-Participants N=13 N	%	Total N	%
Sex						
Male	5	6.3	1	7.7	6	6.5
Female	74	93.6	12	92.3	86	93.5
Year in School						
1	-	-	-	-	-	-
2	39	49.4	11	84.6	50	54.3
3	38	48.1	2	15.4	40	43.5
4	2	2.5	-	-	2	2.2
Semester Hours of Nutrition Coursework						
None	74	93.7	12	92.3	86	93.5
1 - 3	3	3.8	-	-	3	3.3
4 - 6	1	1.3	-	-	1	1.1
Missing	1	1.3	1	7.7	2	2.2
Major						
Nursing	71	89.9	12	92.3	83	90.2
Other	8	10.1	1	7.7	9	9.8
Required Course						
Yes	51	64.6	12	92.3	63	68.5
No	28	35.4	1	7.7	29	31.5
Self-Reported GPA						
Under 2.0	1	1.3	1	7.7	2	2.2
2.0 - 2.49	3	3.8	1	7.7	4	4.3
2.5 - 2.99	18	22.8	2	15.4	20	21.7
3.0 - 3.49	32	40.5	5	38.5	37	40.2
Over 3.5	25	31.6	4	30.5	29	31.5

†Twelve unidentified registrants did not supply information.

TABLE 1 (continued)

Summary Characteristics of Identified Class Registrants[†]

Characteristic	Participants N=79 N	%	Non-Participants N=13 N	%	Total N	%
Have had KR previously						
Yes	16	20.3	2	15.4	18	19.6
No	61	77.2	11	84.6	72	78.3
Don't Know	2	2.5	-	-	2	2.2
Number of Experiences with KR						
1 - 2	6	7.6	1	7.7	7	7.6
3 - 6	7	8.9	-	-	7	7.6
7 or more	3	3.8	1	7.7	4	4.3
Not Applicable	63	79.7	11	84.6	74	80.4
Would Like KR?						
Definitely would	23	29.1	5	38.5	28	30.4
Might like	30	38.0	2	15.4	32	34.8
Don't think so	16	20.3	4	30.8	20	21.7
Definitely not	7	8.9	2	15.4	9	9.8
Undecided	3	3.8			3	3.3

[†]Twelve unidentified registrants did not supply information.

experience; conversely, 35 percent were doubtful that they would like immediate KR on a test.

The Sample. A total of 79 students consented to participate in the study. One student later dropped the class, leaving 78 who participated throughout. The following comparisons of participants and non-participants are based on 79 and 13 cases, respectively. Unidentified registrants are not included.

Chi-square tests of independence of populations (presented in Appendix C) showed that there were no significant differences between participants and non-participants as to self-reported GPA, past experience with immediate KR in the testing situation, or whether they thought they might like to receive KR on a test ($p \geq .40$). Those who considered the course a requirement were slightly less inclined to participate ($p \leq .09$). Significantly more non-participants were sophomores rather than juniors ($p \leq .04$). According to the course instructors, sophomores had not yet been officially admitted to the nursing program at the college, so it could be that such students were more concerned than were the juniors about the possible impact of the experimental procedures.

Although there appears to be no normative data as such for the AAT scales, two authors did report some scores for their subjects. Numbers represent averages for each study, both of which utilized male and female college undergraduates, and are as follows:

	N	F Scale	D Scale
Huck and Jacko, 1974	312	25 ± 5	29 ± 6
Walsh, et al., 1968	197	20 ± 5	22 ± 6

As shown in Table 2, subjects in the present study seem to have scored similarly on the F and D Scales, although standard deviations are somewhat smaller. (The SF Scale will be discussed in a later section.) There were no significant mean differences between participants and non-participants on any of the subscales ($p \geq .30$).

Reliability Estimates

Internal consistency reliability estimates for the three classroom achievement tests are shown in Table 3. Only multiple-choice and true-false items are included in the analysis; short answer items were not answered on either the conventional or the experimental answer sheets and hence were not used in the present study.

Items in Test 2 were found to be quite homogeneous ($KR_{20} = .77$). However, Test 1 and Test 3 items were less so (.48 and .57, respectively.) Test 1 and Test 3 were revised by selectively deleting items which were negatively discriminating (low scoring students answered correctly and high scoring students answered incorrectly) or non-discriminating (all students answered correctly). When all of these items had been deleted, items with point biserial correlations of less than .10 were deleted. Item deletion was halted when the value for KR_{20} decreased, or when the total number of items fell below fifty, whichever occurred first. The KR_{20} estimates for the revised tests are included in Table 3. Neither Test 1 nor Test 3 could be

TABLE 2

Means, Standard Deviations and Range of Scores for Subscales of Achievement Anxiety Test (AAT) for Identified Class Registrants[†]

Subscale	Maximum Possible Score	Total Score Range	Participants N=79			Non-Participants N=13		
			Mean	S.D.	Range	Mean	S.D.	Range
F Scale	45	14-35	24.38	3.70	14-35	24.69	4.19	15-31
D Scale	50	19-40	29.75	4.49	19-40	29.69	4.25	23-38
SF Scale	45	12-36	24.62	5.13	12-36	26.00	4.04	18-34

[†]Twelve unidentified registrants did not supply information.

TABLE 3

Summary Characteristics for Three Classroom Achievement Tests

	N of Items	N of Students†	Range of Scores	Test Mean	Test Variance	S.E.	Avg Item Difficulty	KR_{20}
Test 1								
Original	82	104	58-78	70.00	13.75	2.69	.85	.48
Final Revision	52	104	30-51	45.36	12.86	2.18	.87	.63
Test 2								
Original	81	103	47-80	72.75	27.00	2.51	.90	.77
Test 3								
Original	85	103	65-82	74.23	17.09	2.73	.87	.57
Final Revision	54	103	34-53	45.48	17.96	2.44	.84	.67

†Scores of all class registrants were included in the item analysis, as requested by course instructors

revised such that KR_{20} reached .70 or higher, the level arbitrarily selected as desirable for inclusion in the major data analyses. Therefore, Test 2 scores were preferentially utilized where possible, but all scores were examined.

The low KR_{20} values can be attributed in part to heterogeneity of content, particularly on Test 1, and to the fact that many items were answered correctly by all students, thus decreasing total test variance. Average item difficulty indices indicate that the students found the tests relatively easy, although the range of scores on Test 2 was much greater.

Criterion-referenced reliability estimates perhaps would be more compatible with instructors' goals for the course, but some item revision should probably be attempted in addition. For example, Test 1 contained several items which had obvious clues such as the words "never" and "always." These items were invariably answered correctly by all testees, causing the items to measure, in effect, testwiseness rather than nutrition knowledge.

Effects of Immediate KR and Test Anxiety on Achievement Test Performance

Individual scores, by treatment group, on the original and the revised versions of the three achievement tests, and on the three subscales of the AAT, are presented in Appendix B.

Analysis of variance of the scores of two of the three classroom achievement tests was done, using both the original and the revised versions of Test 1 and the original version of Test 2. The treatments were: Group 1, who received immediate knowledge of results (KR) on

Test 1 but not on Test 2; Group 2, who received immediate KR on Test 2 but not on Test 1; and Group 3, the Control group, who never received immediate KR. In all these analyses the blocking variable was the four anxiety categories, ANXF: Most Affecteds, Facilitators, Debilitators, and Least Affecteds.

The above design was utilized in order to examine: (1) effects of immediate KR and test anxiety on the achievement test scores, and (2) effects of test homogeneity on the analysis of variance.

In addition, analysis of variance of the scores of Test 2 was done substituting the blocking variable of the three anxiety categories, ANXM: Facilitators, Debilitators, and Non-Affecteds. This analysis examined possible effects of the two methods of categorizing the scores of the Achievement Anxiety Test (AAT).

Finally, Test 2 scores were subjected to analysis of covariance using the 3 treatments x 4 anxiety types design, to examine the effect of adjusting cell means with a measure of past achievement, namely, self-reported GPA. This was done since there seems to be some question as to whether the construct of test anxiety is of importance in explaining variance in achievement test scores.

Test 3 scores were not available for comparison in the above manner since allowing some subjects a choice of test format (KR vs no-KR) destroyed both the anxiety blocking variable and the treatment group in all but the Control group.

Analysis of Performance Using Unadjusted Means. Table 4 shows individual cell means and the results of the two-way analysis of

variance of achievement scores on Test 2. Neither of the main effects was significant at the predetermined .05 level. Therefore the null hypotheses of no significant difference in achievement between anxiety categories or treatment groups were not rejected. That is, there was insufficient evidence to establish that test anxiety type or provision of immediate KR was involved in achievement on Test 2.

However, since the interaction between anxiety category and treatment group approached significance ($F = 2.012$, $df = 6$, $p \leq .076$), individual cell means were further examined (Scheffe, 1959). Results revealed that subjects in the Least Affecteds category of the Control group ($N = 6$) had higher achievement scores on Test 2 than subjects in the Debilitators category of the Control group ($N = 6$), $p \leq .10$.

In addition, Figures 2 and 3 present visual impressions comparing achievement test performance reported by Munz and his colleagues, and that suggested by the Control group in the present data analysis. The reader is reminded that the inverted-U hypothesis rests on the assumption of random sequencing of item difficulty. Far from forming an inverted-U, results of the present study appear to demonstrate a negative linear relationship between performance and anxiety, as reported by Osterhouse (1975).

That Least Affected subjects score higher than Debilitators is contrary to results reported by Munz *et al.* (1975), who have found that Debilitators and Least Affecteds have about the same level of performance, and that both are low. Present results would be in agreement with the findings of authors who used a High-Low categorization, however. Debilitators (High test anxiety) would perfrom at

TABLE 4

Achievement Score Means for Students in Four Anxiety Categories (ANXF) With and Without Immediate KR on Test 2

	No KR Group 1	KR Group 2	Control Group 3	Row	
Most Affected	73.33	76.83	72.83	74.33	N = 18
Facilitators	76.14	75.38	77.43	76.27	N = 22
Debilitators	73.86	76.43	70.33	73.70	N = 20
Least Affected	74.83	74.67	80.00	76.50	N = 18
Column	74.58	75.81	75.24	75.22	
	N = 26	N = 27	N = 25		

Two-way Analysis of Variance

Source of Variation	Sum of Squares	DF	Mean Square	F	p
Main Effects	133.241	5	26.648	1.131	.353
Anxiety Category	112.926	3	37.642	1.597	.198
KR	19.010	2	9.505	.403	.670
Two-Way Interaction					
Anxiety Category x KR	284.536	6	47.423	2.012	.076
Explained	417.777	11	37.980	1.611	.116
Residual	1555.518	66	23.568		
Total	1973.295	77	25.627		

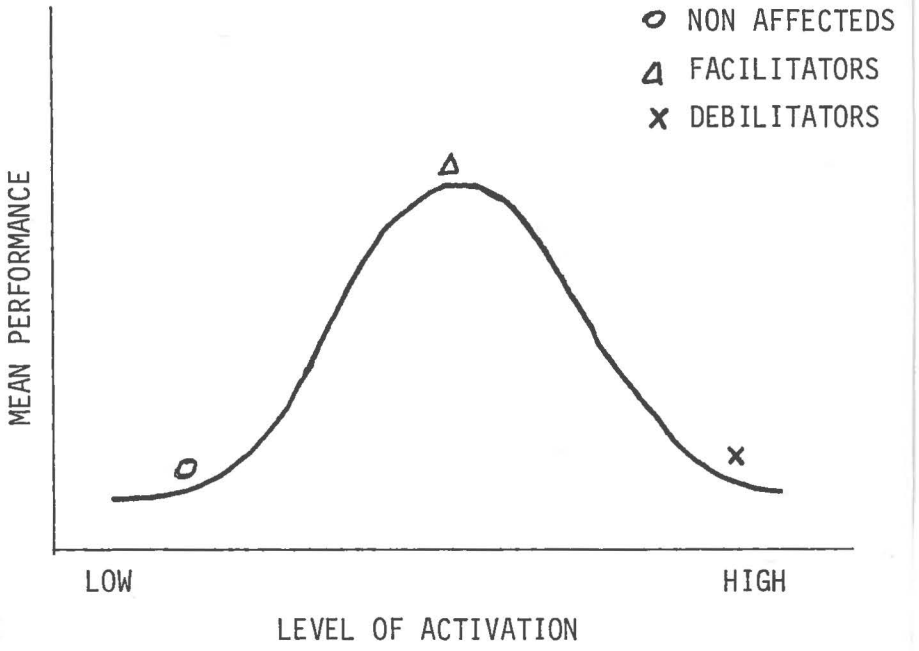


Figure 2. Visual impression of achievement test performance reported by Munz and coworkers.

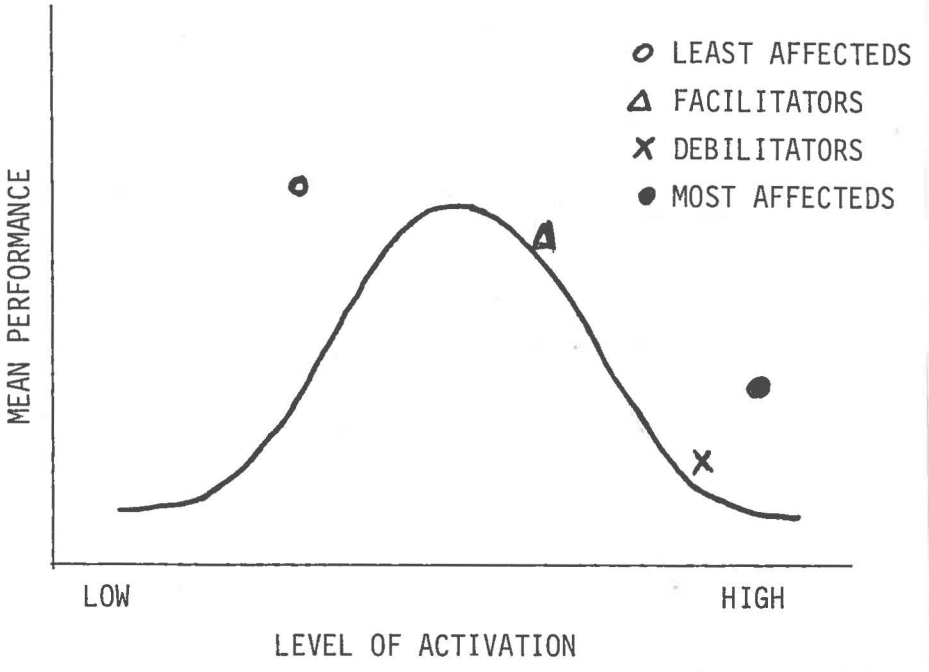


Figure 3. Visual impression of achievement test performance evidence in Control group of present study.

lower levels, while Least Affecteds (Low test anxiety) would perform at higher levels, when no immediate KR was provided.

Of interest is the fact that, for those subjects who did receive immediate KR on Test 2 (Group 2), the pattern of the means appears different from that for subjects not receiving KR. In Groups 1 and 3, with no KR, the achievement scores of the Facilitators and Least Affecteds are higher than those of the Most Affecteds and Debilitators. This situation is reversed for Group 2, the immediate KR condition. The pattern demonstrated by Group 2 suggested that immediate KR might have facilitated the test performance of the Debilitators and the Most Affecteds. Unfortunately, immediate KR also might have depressed the test performance of the Facilitators and the Least Affecteds.

However, the null hypothesis regarding interaction effects between treatment group and anxiety category was not rejected. That is, immediate KR had no significant effect on the achievement test performance of any of the anxiety types for subjects in this study.

Carryover effects of previous KR. Of some concern in interpreting the results of achievement on Test 2 is the fact that Group 1 received immediate KR on Test 1 but not on Test 2, and hence might in some way have been affected. Conceivably these subjects could have been frustrated by the lack of KR on Test 2, which might have been detrimental to their performance. On the other hand, previous experience with KR could have produced some effect that facilitatied Group 1's performance on Test 2.

Since the analysis of variance previously reported in Table 4

found no significant differences between the groups, it is obvious that there were no discernible carryover effects of KR between Test 1 and Test 2. As pointed out, the only means approaching significance were two categories of the Control group (Least Affecteds and Debilitators), neither of which ever received immediate KR. Also, no significant differences in response to KR were found between subjects who had received immediate KR in testing situations prior to the present study and those who had not. Such findings are in agreement with results reported by Betz and Weiss (1976a) and Strang and Rust (1973), both of which found no carryover effect of KR.

Comparison of anxiety group categories. Means and standard deviation of the ANXF (the present author) and the ANXM (Munz and Smouse, 1968) categories on the F Scale, and D Scale, and the SF Scale are presented in Table 5. Since category assignments were made on combinations of the first two scales (FPLUSD and FMINSD), means and standard deviations for these combinations are presented as well. A majority of the subjects appear in the same category with either method, due in part to the limited sample size.

Generally, means for the Facilitators and the Debilitators tend to be lower in the ANXF categories than in the ANXM categories, and their standard deviations tend to be slightly smaller. This could be an effect caused by the ANXF methodology, in which those subjects with the highest total FPLUSD scores were removed before the remainder of the assignments were made.

Although random assignment for the study design was based on ANXF rather than on ANXM, a two-way analysis of variance was run on achievement

TABLE 5

Category Means and Standard Deviations for Individual Scales and Scale Combinations Using Two Methods of Assignment

	Maximum Possible Score	Score Range	Mean		S.D.	
			ANXF	ANXM†	ANXF	ANXM†
F Scale	45	14-35				
Most Affected			26.61	---	3.42	---
Facilitators			26.45	28.18	3.46	3.07
Debilitators			20.65	21.06	2.37	2.61
Least Affected			23.79	21.88	1.51	1.65
D Scale	50	19-40				
Most Affected			33.44	---	3.73	---
Facilitators			24.59	25.32	2.77	3.29
Debilitators			32.45	35.18	2.56	2.48
Least Affected			29.37	27.71	1.38	1.83
SF Scale	45	12-36				
Most Affected			27.94	---	5.59	---
Facilitators			21.14	21.59	4.09	4.27
Debilitators			26.80	29.06	4.43	5.23
Least Affected			23.21	21.82	3.33	2.90
FPLUSD	95	42-64				
Most Affected			60.06	---	1.92	---
Facilitators			51.05	53.50	4.39	5.12
Debilitators			53.10	56.24	3.02	3.70
Least Affected			53.16	49.59	2.67	2.53
FMINSD		16-(-24)				
Most Affected			- 6.83	---	6.89	---
Facilitators			1.86	2.86	4.48	3.76
Debilitators			-11.80	-14.12	3.90	3.50
Least Affected			- 5.58	- 5.82	1.12	2.40

†Later work by Munz, et al. (1975) no longer utilized a Most Affected category, citing lack of consistent results as the reason.

scores on Test 2 substituting the ANXM categories. Table 6 shows the individual cell means and the results of the analysis of variance.

Neither main effect nor the interaction was significant, but the anxiety main effect approached significance ($F = 2.818$, $df = 2$, $p \leq .070$). Further analysis indicated that the Facilitators and the Least Affecteds scored higher on Test 2 than did Debilitators (Scheffe, 1959, $p \leq .10$). These findings are basically the same as resulted from the analysis using the ANXF categories, except that the ANXM results involve a main effect rather than an interaction. Furthermore, the ANXM categorization does not demonstrate the former pattern of the Group 2 means, i.e., a suggestion that immediate KR might have facilitated the performance of the Debilitators and Most Affecteds and depressed the performance of the Facilitators and Least Affecteds.

A comparison of Table 4 (ANXF) and Table 6 (ANXM) indicates that both sets of anxiety categories demonstrated that different anxiety levels performed differently on Test 2 (Scheffe, 1959, $p \leq .10$). Using the ANXM categories, all Debilitators performed less well than all Facilitators and all Least Affecteds, whereas using the ANXF categories, only in the Control group did the Debilitators perform less well, and then only in comparison with the Least Affecteds. The evidence is insufficient to justify use of the ANXF categorization method, unless it could be demonstrated that the Most Affecteds category produced consistent and comprehensible results (as the ANXM method reportedly did not), and that inclusion of this category was desirable.

Comparison of original and revised test scores. Since the reliability of measurement of the dependent variable (test scores) can

TABLE 6

Achievement Score Means for Students in Three Anxiety Categories (ANXM) With and Without Immediate KR on Test 2

	No KR Group 1	KR Group 2	Control Group 3	Row	
Facilitators	75.00	75.14	76.43	75.50	N = 22
Debilitators	71.57	75.40	69.00	71.94	N = 17
Least Affected	74.75	77.33	74.17	75.50	N = 16
Column	73.68	75.94	73.61	74.39	
	N = 19	N = 18	N = 18		

Two-way Analysis of Variance

	Sum of Squares	DF	Mean Square	F	p
Main Effects	205.298	4	51.322	2.045	.104
Anxiety Category	141.417	2	70.708	2.818	.070
KR	56.530	2	28.265	1.126	.333
Two-way Interaction					
Anxiety Category x KR	98.508	4	22.377	.892	.477
Explained	294.798	8	36.850	1.468	.195
Residual	1154.402	46	25.096		
Total	1449.200	54	26.837		

reduce the power of the analysis of variance tests, the more homogeneous scores (Test 2) were used for the preceding analyses. In order to determine the effects of lower test homogeneity, comparative 4 x 3 analyses were run using test scores from the original and from the revised versions of Test 1.

Table 7 shows the results of these two two-way analysis of variance tests, one using as the dependent variable the achievement scores of Test 1 as administered, and the other using the scores of the revised Test 1. The KR_{20} values are .48 and .63, respectively.

The two sets of scores produced somewhat different results. As the homogeneity of the scores became higher, the F ratio increased for the anxiety main effect and decreased for the KR main effect. In fact, what was a significant main effect for KR ($p \leq .05$) with the less homogeneous scores became non-significant ($p \leq .18$) when scores from the more homogeneous version were used. Results using the more homogeneous scores for Test 1 more nearly resembled those obtained using scores for Test 2, which had higher internal consistency. Again, these results are specific to the present test administration, and should be considered tentative.

It is possible that these results merely demonstrate the effects of tampering with test content and/or the effect of reducing total test variance, owing to the deletion of items. It is also possible that changing the content of a classroom test will affect the assessment of test anxiety, or other independent variables of interest. It would seem imperative, therefore, that researchers report some indications of

TABLE 7

Two-way Analysis of Variance Using Achievement Scores of Differing Reliability Estimates for Test[†]

	Test 1 KR_{20} = .48 Items = 82					Revised Test 1 KR_{20} = .63 Items = 52				
Source of Variation	Sum of Squares	DF	Mean Square	F	p	Sum of Squares	DF	Mean Square	F	p
Main Effects	139.843	5	27.969	1.645	.160	69.609	5	13.992	1.268	.288
Anxiety Category	18.283	3	6.094	.358	.783	33.732	3	11.244	1.024	.388
KR	124.368	2	62.184	3.658	.031	37.884	2	18.942	1.725	.186
Two-Way Interaction										
Anxiety Category x KR	102.041	6	17.007	1.000	.433	38.614	6	6.436	.586	.740
Explained	241.885	11	21.990	1.294	.248	108.223	11	9.838	.896	.549
Residual	1138.976	67	17.000			735.524	67	10.978		
Total	1380.861	78	17.703			843.747	78	10.817		

[†]Treatment groups and anxiety levels are the major experimental variables as shown in Table 4.

kind and/or level of reliability estimates for the test scores being analyzed.

Analysis of Performance Using Adjusted Means. Because of the diversity of opinion regarding the relationships among test anxiety, ability, and performance, the investigator ran an analysis of covariance on the scores on Test 2 using self-reported GPA as a covariate. Such an analysis examines the simultaneous effects of GPA, immediate KR, and test anxiety. The linear relationships among the variables might be questioned since Munz and associates report evidence of curvilinearity, and at least one study (Osterhouse, 1975) found negative linearity.

Interrelations among the variables are shown in Table 8. Bivariate plots of the F Scale and D Scale scores, as well as those of each with self-reported GPA, are shown in Appendix B. This evidence suggests that the relationships in the present study are linear. Since FMINSD and FPLUSD can be viewed as linear transformation of these scores, they should maintain the linearity that is present. It is therefore reasonable to assume a linear relationship between the covariate of GPA and the anxiety categories. There is no reason to believe that the other assumptions were violated. Therefore, a 4 x 3 analysis of covariance was run using Test 2 scores. Results are presented in Table 9, with the null hypothesis of no effect due to self-reported GPA being rejected ($p \leq .001$). It would appear that the higher mean achievement of the Least Affecteds in the Control group--which approached statistical

TABLE 8

Correlations Among GPA, Test Anxiety Measures[†] and Achievement Scores on Test 2

	GPA	F Scale	D Scale	SF Scale	FPLUSD	FMINSD	Test 2
GPA		.38***	-.26**	-.23	.05	.38***	.46***
F Scale			-.38***	-.22	.45***	.80***	.17
D Scale				.62***	.65***	-.86***	-.20
SF Scale					.41***	-.52***	-.04
FPLUSD						-.17	-.06
FMINSD							.23
Test 2							

[†]The reader is reminded that FPLUSD and FMINSD show autocorrelation with their individual scales.

** significantly different from zero, $p \leq .01$, two-tailed test, N = 78.

*** significantly different from zero, $p \leq .005$, two-tailed test, N = 78.

TABLE 9

Two-way Analysis of Covariance for Four Anxiety Categories (ANSF) With and Without Immediate KR Adjusted for Self-Reported GPA

Source of Variation	Sum of Squares	DF	Mean Square	F	p
Covariates					
GPA	347.430	1	347.430	19.669	.001
Main Effects	52.698	5	10.540	.597	.703
Anxiety	46.996	3	15.665	.887	.453
KR	5.641	2	2.820	.160	.853
Two-way Interaction					
Anxiety x KR	142.369	6	23.728	1.343	.251
Explained	542.497	12	45.208	2.559	.008
Residual	1130.490	64	17.664		
Total	1672.987	76	22.013		

significance--could be primarily due to the fact that these subjects had a higher self-reported GPA. Such results are in agreement with the findings of Boor (1972), i.e., that a measure of ability might be sufficient to explain the variance in test scores.

In summary, subjects in the present study did not demonstrate significantly different achievement test performance when examined by anxiety category, nor was their performance significantly different whether or not immediate KR was provided during testing.

Response Characteristics

At this point it has been established that provision of immediate KR had little effect one way or the other on Test 2 performance. Furthermore, it has also been established that various levels of test anxiety had little effect on performance on Test 2. Those tendencies that were observed might be better explained by one measure of ability/past achievement, namely, GPA.

Data collected in order to examine possible correlates of liking for immediate KR, or any motivational effects that could be attributed to its provision, include: (1) responses to items regarding subjects' reaction to KR, (2) choice of a KR answer sheet or a conventional answer sheet, and (3) responses to additional items thought to measure test reactions from the standpoint of anxiety motivation and perceived difficulty. These analyses will now be presented.

Reaction to Provision of Immediate KR. Table 10 summarizes the responses to provision of KR of Group 1 (immediate KR on Test 1 but no-KR on Test 2) and Group 2 (immediate KR on Test 2 but no-KR on Test 1). There were no significant differences between the two groups. Responses to Item 6 (feelings on finding out that answers were incorrect) approached significance ($p \leq .07$). In this instance Group 1 indicated that they were more bothered than Group 2 when they found that their answers were incorrect. An unanticipated problem which arose during the study could be partially responsible for these reactions. This problem involved a series of five items which were incorrectly coded on the immediate KR answer sheet for Test 1, and which had remained undetected until questioned by one of the testees. The feedback for these five items was thus opposite to what it should have been. Students were assured that the section would be double-checked, and they would receive credit for all correct answers regardless of what the answer sheet showed, but the credibility of the researcher was severely shaken. At least one student in the first section reported the event to the second class section, and it was rumored that the researcher was in reality trying to trick students into being more anxious, and had, in effect, lied. Student fears were not completely allayed until answer sheets were returned and discussed (the customary procedure) two class periods later. None of the subjects dropped out of the study, but the extent to which this occurrence influenced responses of Group 1 to provision of immediate

TABLE 10

Summary of Responses to Provision of Immediate KR†

Item and Response	KR on Test 1 Group 1 N = 27				KR on Test 2 Group 2 N = 27				Total N=54	
	N	%	Mean	S.D	N	%	Mean	S.D.	N	%
1. Did getting feedback on this test make it more interesting or less interesting?			1.37	.63			1.37	.49		
1. Much more interesting	19	70.4			17	63.0			36	66.7
2. Somewhat more interesting	6	22.2			10	37.0			16	29.6
3. Didn't make any difference	2	7.4			-	-			2	3.7
4. Somewhat less interesting	-	-			-	-			-	-
5. Much less interesting	-	-			-	-			-	-
2. Did receiving feedback after each question interfere with your ability to concentrate on the test?			2.19	1.18			2.07	1.07		
1. No, not at all	9	33.3			9	33.0			18	33.3
2. Yes, somewhat	11	40.7			12	44.0			23	46.2
3. Yes, moderately so	-	-			1	3.7			1	1.9
4. Yes, very much so	7	25.9			5	18.5			12	22.2
3. Did getting feedback after each question make you nervous?			2.63	.88			2.41	.97		
1. No, not at all	2	7.4			3	11.1			5	9.3
2. Yes, somewhat	11	40.7			16	59.3			27	50.0
3. Yes, moderately so	9	33.3			2	7.4			11	20.4
4. Yes, very much so	5	18.5			6	22.2			11	20.4
4. Did you try harder to get the questions right because you knew you would get feedback after each question?			3.04	1.13			2.96	1.16		
1. No, not at all	3	11.1			3	11.1			6	11.1
2. Yes, somewhat	7	25.9			9	33.3			16	29.6
3. Yes, moderately so	3	11.1			1	3.7			4	7.4
4. Yes, very much so	14	51.9			14	51.9			28	51.9

†Only Groups 1 and 2 received immediate KR. Group 3 (N = 25) served as the Control group and never received KR.

TABLE 10 (continued)

Summary of Responses to Provision of Immediate KR

Item and Response	KR on Test 1 Group 1 N = 27				KR on Test 2 Group 2 N = 27				Total N=54	
	N	%	Mean	S.D.	N	%	Mean	S.D.	N	%
5. Were you interested in knowing whether your answers were right or wrong?			1.56	.93			1.37	.79		
1. I was very interested	19	70.4			21	77.8			40	74.1
2. I was moderately interested	2	7.4			3	11.1			5	9.3
3. I was somewhat interested	5	18.5			2	7.4			7	13.6
4. I didn't care at all	1	3.7			1	3.7			2	3.7
6. How did you feel when you found that your answers were incorrect?			1.30	.54			1.62	.74		
1. It bothered me a lot	20	74.1			14	51.9			34	63.0
2. It bothered me some	6	22.2			9	33.3			15	27.8
3. It bothered me a little	1	3.7			4	14.8			5	9.3
4. It didn't bother me at all	-	-			-	-			-	-
7. How do you feel about getting feedback?			2.33	.96			2.52	.85		
1. I'd rather not know whether my answers were right or wrong	9	33.3			6	22.2			15	27.8
2. I really don't care whether I get feedback or not	-	-			1	3.7			1	1.9
3. I liked getting the feedback	18	66.7			20	74.1			38	70.4

†Only Groups 1 and 2 received immediate KR. Group 3 (N = 25) served as the Control group and never received KR.

KR is unkown. Group 1 mean responses to the KR items were not significantly different from those of Group 2 however, who received immediate KR approximately 2-3 weeks after the incident.

In general, 67 percent of the total respondents said that receiving immediate KR made the testing situation much more interesting, 30 percent somewhat so and no one stated that they found it less interesting. Only two subjects said it didn't make any difference. About 70 percent indicated that they were very interested in whether their answers were right or wrong, and about the same number liked getting the feedback. Only six subjects stated that they did not try harder because they knew they would be getting immediate feedback.

In contrast, 28 percent stated that they would rather not know whether their answers were right or wrong. More than two-thirds (68 percent) of the respondents said that the feedback interfered with their ability to concentrate, and 91 percent said it made them nervous. Knowledge of incorrect answers bothered 64 percent of the students "a lot," this response being somewhat stronger for Group 1 (74 percent) than for Group 2 (52 percent). Overall, respondents liked getting immediate KR, evidently in spite of the fact that it seemed to make the testing situation more stressful for them. Such reactions were also reported by Betz and Weiss (1976b).

Chi-square tests of independence of response to the background variables (1) year in school, (2) whether this course was required or elective and (3) self-reported GPA, were all non-significant ($p \geq .40$). Thus there was no significant relationship between these

characteristics and reactions to the provision of immediate KR.

Chi-square tests of independence of response to previous experience with KR in testing situations and whether subjects thought they would like KR were also non-significant ($p \geq .15$). Likewise, chi-square tests of independence of response to anxiety category (ANXF) were non-significant ($p \geq .10$). Apparently these variables did not significantly influence the reactions of the subjects to KR. (All chi-square tables are presented in Appendix C.)

Responses to each of the seven items were correlated with performance on Test 1 (both the original and the revised versions) for Group 1 and performance on Test 2 for Group 2. Results are shown in Table 11. Group 2 subjects who achieved higher on Test 2 reported that they were significantly less bothered by knowledge of incorrect answers. This could be because they had few incorrect answers to be bothered about, but more likely is associated with the errors on the Test 1 KR answer sheet encountered by Group 1. There was also a non-significant tendency for high achievers in Group 1 to report that receiving KR did not cause them to try harder. Again, these responses might have been influenced by the answer sheet errors. In general, however, responses to immediate KR were not strongly associated with test performance. This was true for both versions of Test 1.

Differences in achievement scores themselves were non-significant, as previously reported in Tables 4 and 6. Therefore, Test 1 and Test 2 performances were not significantly affected by KR, nor were responses to its provision significantly related to test performance.

TABLE 11

Pearson Produce Moment Correlations Among Immediate KR Item Responses and Achievement Scores on Test 1 or Test 2

Item†	KR on Test 1 Group 1 N = 27		KR on Test 2 Group 2 N = 27
	Original Test KR_{20} = .48 Items = 82	Revised Test Kr_{20} = .63 Items = 52	Original Test KR_{20} = .77 Items = 81
1 (KR lowered interest)	.11	.08	.07
2 (KR lowered concentration)	-.05	-.09	.06
3 (KR increased nervousness)	.10	.12	.10
4 (KR increased effort)	-.27	-.30	-.01
5 (Lowered interest in correctness)	.24	.13	-.05
6 (Less bothered by correctness)	.07	.16	.44*
7 (Liked KR)	-.22	-.19	.02

†Item descriptors are worded to reflect the highest end of the response continuum.

*Significantly different from zero, $p \leq .05$, two-tailed test.

Total responses of both groups to each of the seven items were intercorrelated to examine relationships among responses. Results are shown in Table 12. Students who said that they did not want to know whether their answers were right or wrong reported increased nervousness, lowered concentration, and lowered interest, both in whether or not their answers were correct and in the test generally. Students who reported being most bothered by whether or not their answers were correct reported increased interference with concentration, increased nervousness, and increased effort. Further, students who said that receiving KR increased their nervousness quite uniformly said that it interfered with their concentration.

Thus there is some evidence that students who expressed a dislike for immediate KR during testing had consistent reasons for doing so. However, such students cannot be separated out on the basis of year in school, whether the course was a requirement for them, self-reported GPA, previous experience with KR, anxiety category, or achievement scores on the tests.

They appear to be a distinct minority.

Choice of Immediate KR. The subjects seemed to have expressed their true feelings on the preceding response items. Of the 54 subjects who received KR, either on Test 1 or Test 2, 33 (61 percent) voluntarily chose to take Test 3 using the immediate KR answer sheet. Sixteen (29 percent) chose the conventional no-KR answer sheet. Four subjects who were eligible to choose could not be contacted and so received the conventional answer sheet for Test 3. Following the first

TABLE 12

Pearson Product Moment Correlations Among Immediate KR Item Responses

Item†	1	2	3	4	5	6	7
1 (KR lowered interest)	--	.19	.02	-.30	.58***	-.01	-.32
2 (KR interferred with concentration)		--	.59***	.06	.33	-.49***	-.41
3 (KR increased nervousness)			--	.18	.19	-.39	-.49***
4 (KR increased effort)				--	-.21	-.22	.23
5 (Lowered interest in correctness)					--	-.21	-.38
6 (Less bothered by correctness)						--	.33
7 (Liked KR)							--

†Item descriptors are worded to reflect the highest end of the response continuum.

***Significantly different from zero, $p \leq .001$, two-tailed test, N = 54.

test, one subject had dropped the class. The percentage of subjects that chose the conventional answer sheet is extremely close to the percentage of respondents that stated that they would rather not know whether their answers were right or wrong. If these individuals are the "distinct minority" just mentioned, and there is reason to believe they might be, they can be identified in succeeding analyses as the group choosing no-KR.

Chi-square tests of independence of populations between those who chose the immediate KR answer sheet and those who chose the no-KR answer sheet showed no significant differences for year in school, for whether the course was required or elective, or for self-reported GPA ($p \geq .30$); for anxiety category ($p \geq .70$); or for whether KR was received on Test 1 or Test 2 ($p \geq .40$). Experience with immediate KR prior to the present study was also non-significant ($p \geq .10$) although there was more of a tendency for those who had no past experience with KR to choose not to receive it on Test 3. Thus it appears that the best predictor of choice of KR answer sheet was response to Item 7, i.e., that subjects liked receiving KR or that they would rather not know whether answers were right or wrong.

One factor which might have influenced choice of answer sheet was the test score itself. That is, if a subject scored higher or lower on a test using an immediate KR answer sheet, might that consciously or unconsciously influence choice? This question was examined using the four possibilites (KR on Test 1 or Test 2 and higher or lower score). The test of independence was non-significant (chi-square = 5.05, df = 3, $p \leq .17$). Subjects who received immediate KR

on Test 1 and got a lower score than on Test 2 tended to choose KR about equally, whereas in the other groups a majority chose KR. It could be that students tended to attribute lower scores on the first test to other factors, such as the fact it was the first test in a new course. (All chi-square tables are presented in Appendix C).

The present results are different from those reported by Janisse (1973), who found that subjects chose the traditional test format 3.5 to 1, although high anxiety subjects were slightly more likely to choose the non-traditional. The KR format certainly is non-traditional, but was chosen 2 to 1, regardless of the anxiety category. However, choosing to receive immediate KR on a pencil and paper test probably is not comparable with the Janissee choices of an oral exam or a 6-10 page essay.

Reaction to Testing Situation on Test 3. Table 13 summarizes the responses of those choosing immediate KR, those choosing no-KR, and the Control group to the items concerning anxiety, motivation, and perceived difficulty experienced during the third and final course exam. Examination of the group mean responses indicated that the items were answered somewhat differently by the three groups of subjects, and in several instances the means are significantly different.

Viewed as a whole, respondents reported that they worried fairly much about how they would do and were somewhat nervous and tense. They were careful to select correct answers, cared a lot about how well they did on the test, felt challenged, and were about equally divided

TABLE 13

Summary of Responses[†] to Anxiety, Motivation, and Perceived Difficulty Items Following Test 3

	Controls N = 25				Chose KR N = 33				Chose no-KR N = 16				Total N=74	
Item and Response	N	%	Mean	S.D.	N	%	Mean	S.D.	N	%	Mean	S.D.	N	%
Anxiety Items														
2. During testing, did you worry about how well you would do?			2.84	.75			3.06	.86			2.88	.72		
1. Not at all	1	4.0			1	3.0			-	-			2	2.6
2. Somewhat	6	24.0			8	24.2			5	31.3			19	24.4
3. Fairly much so	14	56.0			12	36.4			8	50.0			36	46.2
4. Very much	4	16.0			12	36.4			3	18.8			21	26.9
4. Were you nervous while taking the test?			2.32	.63			2.30	.59			2.31	.48		
1. Not at all	1	4.0			2	6.1			-	-			4	5.1
2. Somewhat	16	64.0			19	57.6			11	68.8			46	59.0
3. Moderately so	7	28.0			12	36.4			5	31.3			27	34.6
4. Very much so	1	4.0			-	-			-	-			1	1.3
6. How did you feel while taking the test?			2.40	.87			2.61	.93			2.25*	.68		
1. Very tense	2	8.0			-	-			1	6.3			3	3.8
2. Somewhat tense	15	60.0			22	66.7			11	68.8			51	65.4
3. Neither tense nor relaxed	4	16.0			3	9.1			3	18.8			11	14.1
4. Somewhat relaxed	4	16.0			7	21.2			1	6.3			12	15.4
5. Very relaxed	-	-			1	3.0			-	-			1	1.3

[†] Four students who could not be contacted received no KR, but are not included in the analysis.

* Significantly different, $p \leq .05$.

TABLE 13 (continued)

Summary of Responses† to Anxiety, Motivation, and Perceived Difficulty Items Following Test 3

Item and Response	Controls N = 25				Chose KR N = 33				Chose no-KR N = 16				Total N=74	
	N	%	Mean	S.D.	N	%	Mean	S.D.	N	%	Mean	S.D.	N	%
Motivation Items														
3. How frequently were you careful to select what you thought was the best answer to each question?			1.44	.58			1.33	.48			1.31	.48		
1. Almost always	15	60.0			22	66.7			11	68.8			50	64.1
2. Frequently	9	36.0			11	33.3			5	31.3			27	34.6
3. Sometimes	1	4.0			-	-			-	-			1	1.3
4. Rarely	-	-			-	-			-	-			-	-
5. Never	-	-			-	-			-	-			-	-
5. Do you think that you could have done better on the test if you had tried harder?			2.84	1.03			2.52*	1.18			2.73	1.10		
1. I definitely could have	1	4.0			7	21.2			2	12.5			11	14.3
2. I probably could have	10	40.0			12	36.4			4	25.0			26	33.8
3. I'm not sure	8	32.0			5	15.2			6	37.5			19	24.7
4. I probably couldn't have	4	16.0			8	24.2			2	12.5			17	22.1
5. I definitely couldn't have	2	8.0			1	3.0			1	6.3			4	5.2
Missing									1	6.3				
8. Did you feel challenged to do as well as you could on the test?			3.04**	.79			3.18	.81			3.44	.63		
1. Not at all	-	-			-	-			-	-			-	-
2. Somewhat	7	28.0			8	24.2			1	6.3			17	21.8
3. Fairly much so	10	40.0			11	33.3			7	43.8			29	37.2
4. Very much so	8	32.0			14	42.4			8	50.0			32	41.0
10. Did you care how well you did on the test?			1.04	.20			1.18	.39			1.19	.40		
1. I cared a lot	24	96.0			27	81.8			13	81.3			67	85.9
2. I cared some	1	4.0			6	18.2			3	18.8			11	14.1
3. I cared a little	-	-			-	-			-	-			-	-
4. I cared very little	-	-			-	-			-	-			-	-
5. I didn't care at all	-	-			-	-			-	-			-	-

TABLE 13 (continued)

Summary of Responses† to Anxiety, Motivation, and Perceived Difficulty Items Following Test 3

Item and Response	Controls N = 25 N	%	Mean	S.D.	Chose KR N = 33 N	%	Mean	S.D.	Chose no-KR N = 16 N	%	Mean	S.D.	Total N = 74 N	%
Perceived Difficulty Items														
1. How often did you feel that the questions in the test were too easy for you?			3.20**	.41			3.64	.74			3.63	.81		
1. Always	–	–			–	–			–	–			–	–
2. Frequently	–	–			2	6.1			1	6.3			4	5.1
3. Sometimes	20	80.0			11	33.3			6	37.5			38	48.7
4. Seldom	5	20.0			17	51.5			7	43.8			31	39.7
5. Never	–	–			3	9.1			2	12.5			5	6.4
7. Did you feel frustrated by the difficulty of the test questions?			2.00	.58			1.82**	.64			2.25	.68		
1. Not at all	3	12.0			10	30.3			2	12.5			15	19.2
2. Somewhat	20	80.0			19	57.6			8	50.0			50	64.1
3. Fairly much so	1	4.0			4	12.1			6	37.5			12	15.4
4. Very much so	1	4.0			–	–			–	–			1	1.3
9. How well do you feel you did on this test in comparison to your performance on other tests like this?			3.36	.57			2.94**	.75			3.56	.73		
1. Much better	–	–			1	3.0			–	–			1	1.3
2. Somewhat better	1	4.0			7	21.2			1	6.3			9	11.5
3. About the same	14	56.0			18	54.5			6	37.5			40	51.3
4. Somewhat worse	10	40.0			7	21.2			8	50.0			27	34.6
5. Much worse	–	–			–	–			1	6.3			1	1.3

**Significantly different, $p \leq .01$.

in their opinions as to whether they could have done better had they tried harder. Since "tried harder" was not defined, some students probably interpreted the question to refer to previous effort rather than to test effort. Respondents also stated that they felt that the test questions were "frequently" and "sometimes" too easy, although they were "somewhat" frustrated by difficulty, and that they probably performed about the same as or somewhat worse than they did on other tests.

When the item responses were examined via the KR-no KR dimension, there was some evidence that provision of KR did have some effect on subjects' reactions to the testing situation. Students who had elected to receive KR expressed significantly less frustration with question difficulty and thought that they might have done better than usual on Test 3, but that had they tried harder, they might have done better still. Subjects who chose not to receive KR reported feeling more tense than did those who chose KR. Members of the Control group were more likely to say that questions were too easy and that they did not feel challenged.

In order to examine whether there was a difference in test achievement among the three groups, scores for both the original and the revised versions of Test 3 were each compared, using one way analysis of variance. Results are shown in Table 14; and indicate that neither of the sets of scores show significant difference in achievement among groups.

Since there was no significant difference between groups in test performance, item responses were pooled and responses to each of the

TABLE 14

Achievement Test Means With and Without Immediate KR on Test

	Controls N = 25	Chose KR N = 33	Chose no-KR N = 16
Test 3 (original)	73.86	74.67	72.44
Test 3 (revised)	45.20	45.97	43.67

One Way Analysis of Variance

	Test 3 KR_{20} = .57 Items = 85					Revised Test 3 KR_{20} = .67 Items = 54				
	Sum of Squares	DF	Mean Square	F	p	Sum of Squares	DF	Mean Square	F	p
Within Groups	1070.31	71	15.07			1092.30	70	15.60		
Between Groups	54.34	2	27.17			54.74	2	27.37		
				1.80	.17				1.75	.18
Total	1124.65	73				1147.04	72			

ten items were correlated with performance on Test 3 (both the original and the revised version). Results presented in Table 15 indicate that only for one item were responses significantly related to test performance. In this instance, perceived difficulty item #7 ("Did you feel frustrated by the difficulty of the test questions?") was inversely correlated with achievement. In other words, subjects who scored high on Test 3 expressed less frustration with question difficulty, which is not surprising.

Total responses to each of the ten items also were intercorrelated to examine relationships among responses. Results are shown in Table 16. Students who reported higher levels of worry also reported higher levels of nervousness and feeling tense, and these same students reported more frustration with question difficulty. Higher frustration was further associated with feelings of having performed worse than usual.

Thus, it seems that choosing to receive or actually receiving immediate KR made little or no difference in performance on Test 3. Furthermore, receiving KR for a second time did not significantly affect performance, since all those who chose the KR answer sheet on Test 3 had received KR on a previous test, but did not perform significantly different than those who chose not to receive KR or those who had never received KR (see Table 14). The control group mean performance was very similar to that of the group who chose KR, and the mean performance of those choosing not to receive KR was somewhat lower, but this difference was not significant. Responses

TABLE 15

Pearson Product Moment Correlations Among Anxiety, Motivation and Perceived Difficulty Item Responses and Achievement Scores on Test 3

Item†	N = 78 Original KR_{20} = .57 Items = 85	N = 77 Revised KR_{20} = .67 Items = 54
Anxiety		
2 (More worried)	-.13	-.12
4 (More nervous)	-.02	-.03
6 (Less tense)	.16	.07
Motivation		
3 (Not careful in answering)	-.15	-.17
5 (Could not have done better)	.12	.10
8 (More challenged)	.20	.15
10 (Didn't care about test)	.10	.06
Perceived Difficulty		
1 (Questions not too easy)	-.08	-.08
7 (More frustrated by difficulty)	-.37***	-.36***
9 (Performed worse than usual)	-.22	-.19

† Item descriptors are worded to reflect the highest end of the response continuum.

***Significantly different from zero, $p \leq .001$, two-tailed test.

TABLE 16

Pearson Product Moment Correlations Among Anxiety, Motivation, and Perceived Difficulty Item Responses

Item	2	4	6	3	5	8	10	1	7	9
Anxiety										
2 (More worried)		.41***	-.45***	.02	-.03	.11	-.17	.07	.28	.03
4 (More nervous)			-.52***	.03	.08	.32	-.22	.07	.36***	.04
6 (Less tense)				-.00	-.08	-.05	.27	.10	-.38***	-.11
Motivation										
3 (Not careful in answering)					-.03	-.22	-.01	.12	.13	.05
5 (Could not have done better)						.17	-.26	-.04	.20	-.05
8 (More challenged)							-.10	-.00	.06	-.06
10 (Didn't care about that)								.20	.01	.13
Perceived Difficulty										
1 (Questions not too easy)									.16	.19
7 (More frustrated by difficulty)										.32
9 (Performed worse than usual)										

Item descriptors are worded to reflect the highest end of the response continuums.

***Significantly different from zero, $p \leq .001$, two-tailed test, N = 78.

to the anxiety, motivation, and perceived difficulty items showed some differences in reaction to the testing situation, in that those receiving KR expressed significantly less frustration with question difficulty than those not receiving KR. It is reasonable to suggest, then, that choosing to receive and receiving immediate KR somewhat affected reactions to the testing situation, but that it did not affect performance on Test 3.

Subjects in the ANXF categories have been examined for differences in performance, and no significant differences were found (Table 4, Table 7, Table 14). Correlations between the uncategorized scale scores (F Scale, D Scale, and SF Scale) and Test 2 performance also were reported (Table 8) and were not significantly different from zero. Correlations between scores on these scales and scores on the original and revised versions of Tests 1 and 3 are presented in Table 17. F Scale scores are significantly correlated with scores on Test 3 (both original and revised versions) and SF Scale scores show a significant negative correlation with scores on the revised version of Test 1. These three coefficients are approximately .25, however, which is fairly low. Thus, there is little evidence that achievement test scores were strongly related to scores on the scales of the AAT, or influenced by the ANXF categories or the provision of immediate KR. Furthermore, none of the studies of subject characteristics or responses were able to shed much light on the test score variance.

There remains the fact that within the study population there was the "distinct minority" who did not like KR and did not wish to receive it. These subjects reported that KR made them nervous and

TABLE 17

Pearson Product Moment Correlations Among F Scale, D Scale, and SF Scale Scores and Achievement Test Scores

	Test 1		Test 3	
	Original KR_{20}=.48 Items=82	Revised KR_{20}=.63 Items=52	Original KR_{20}=.57 Items=85	Revised KR_{20}=.67 Items=54
F Scale	.11	.13	.25*	.26*
D Scale	-.08	-.11	-.21	-.14
SF Scale	-.17	-.25*	-.18	-.18

*Significantly different from zero, $p \leq .05$, two tailed test, N = 92.

tense, but it should be noted that the no-KR group of Test 3 still reported significantly more feelings of tension than the other groups. It was not possible to determine whether either the "distinct minority" or the no-KR groups were in fact all members of one ANXF category. There is reason to believe that they might have been in more than one category, simply because it was so impossible to classify them. For example, choice of KR answer sheet was independent of ANXF, ($p \geq .70$), as was response on Item 7, liking for KR ($p \geq .70$).

Considerations in the Provision of Immediate KR

The process of providing KR is not without problems, if the present study can be used as an example. Several points should be considered.

First, errors in construction of the KR answer sheet are likely to be very upsetting to the testee. This did occur on the first test, and as reported, caused considerable concern.

Second, preparation of the Action Mark KR answer sheets used is both time consuming and expensive. The cost per single answer sheet used in the present study was approximately $1.25, since special formats were needed and only one hundred copies of each test were prepared. However, it would be possible to key tests to mass produced Action Mark or other answer sheets available at much less cost: from $.04 to $.12 per copy. Time commitment for the classroom instructor would not be reduced, however.

Third, answers cannot be changed on the KR answer sheets. Subjects in the present study seemed to be bothered by this aspect of the

answer sheets, even though a majority of them reacted favorably to provision of KR.

Lastly, some students apparently are tempted to cheat. By placing the special wax crayon on an answer box, the latent printing can be "coaxed" into a faint image, and if the symbol is incorrect, another box can be tried. Several students attempted this on Test 1, and a lesser number tried it on Test 2. It did not happen at all on Test 3. Such items were counted as incorrect by the course instructors, who discussed the matter when the tests were returned. In order to discourage the temptation to cheat, symbols could be placed randomly within the answer boxes, rather than centered, and could be similar in shape, e.g., E and F. The present study utilized X and O which appeared distinctly different, and the symbols were always centered, both of which seemed to facilitate cheating.

For these reasons, provision of immediate KR for pencil and paper tests may not be too realistic an alternative in most classroom testing situations. Stronger evidence for its efficacy is necessary, at least more so than was found in the present study.

Analysis of Self-Focus (SF) Scale Characteristics

The SF Scale consisted of nine items, each scored on a five-point continuum; four items were selected from among those used as "buffer items" in the original AAT and five were constructed by the author. All were postulated to reflect a "self focus" rather than a "task focus" as distinguished by Wine (1971). The reader is reminded that these items were included in the AAT along with items of the F and

D Scales, and were administered at the beginning of the study.

For the 92 subjects who responded to the items, the SF Scale showed a mean of 24.82 (out of a possible 45 points), and a standard deviation of 4.99; Coefficient Alpha was .70. In almost all cases, each item response continuum was fully utilized. Responses are summarized in Table 18.

Approximately 30 percent of the respondents reported that during a test they usually or often wonder how other people are doing, and 22 percent sometimes do. Further, about 63 percent stated that always or quite often they wonder whether the instructor will be disappointed in their performance. During testing, a dread of finding out the final test score was "always" the case for about 8 percent, "usually" for about 27 percent, and "sometimes" for 38 percent. Such percentages would seem to suggest a great deal of preoccupation with matters other than the task at hand. Given the highly competitive situation in most classes, perhaps to be expected were the responses concerning performing as well as everybody else: 49 percent "usually" or "often" and 21 percent "sometimes" worry about appearing dumb if their performance is not as good as that of others. More surprising were the responses to the item "During a test I tend to feel helpless." Not a single respondent said "never" and only 4 percent said "hardly ever." Forty-eight percent sometimes, 41 percent usually, and almost 7 percent always feel helpless during a test. Such findings raise questions not only about the stress of the testing situation, but also about valid measurement of classroom achievement for such persons.

TABLE 18

Summary of Responses to SF Scale Items[†]

Item	AAT Serial Position	N	%	Mean	S.D.
When I am taking a text, I often wonder how other people are doing.	4			3.23	1.20
1. This is usually true		8	8.7		
2. This is often true		20	21.7		
3. Sometimes		20	21.7		
4. This is hardly ever true		31	33.7		
5. Definitely not true		13	14.1		
During a test I sometimes think about whether the instructor will be disappointed in my performance.	7			2.24	1.04
1. I almost always think of this		26	28.3		
2. I quite often think of this		32	34.8		
3. I sometimes think of this		21	22.8		
4. I hardly ever think of this		12	13.0		
5. I never think of this		1	1.1		
When I feel confident about my ability to do well on the test,	8[†]			2.58	.97
1. anxiety does not bother me at all		13	14.1		
2. anxiety bothers me very rarely		32	34.8		
3. anxiety may still bother me sometimes		28	30.4		
4. I still often feel somewhat anxious		19	20.7		
5. I still feel very anxious		-	-		
When I am taking a test, I find myself almost dreading to find out what my score will be when the test is graded and returned.	13			2.86	1.00
1. Always		8	8.7		
2. Usually		25	27.2		
3. Sometimes		35	38.0		
4. Hardly ever		20	21.7		
5. Never		4	4.3		
During a test I get very concerned that I must perform as well as everybody else or they will think that I'm dumb	20			2.68	1.25
1. This is usually true		19	20.7		
2. This is often true		26	28.3		
3. Sometimes		19	20.7		
4. This is hardly ever true		21	22.8		
5. Definitely not true		7	7.6		

TABLE 18 (continued)

Summary of Responses to SF Scale Items†

Item	AAT Serial Position	N	%	Mean	S.D.
During a test I tend to feel helpless	22			2.50	.69
1. Always		6	6.5		
2. Usually		38	41.3		
3. Sometimes		44	47.8		
4. Hardly ever		4	4.3		
5. Never		-	-		
During an exam or test, I become conscious of my heartbeat.	25†			2.28	1.14
1. Almost always		29	31.5		
2. Frequently		27	29.3		
3. Sometimes		19	20.7		
4. Hardley ever		15	16.3		
5. Never		2	2.2		
Relative to other students, I seem to have more (or less) than the average amount of harmful nervousness about tests and exams.	27†			3.14	.86
1. Much more		3	3.3		
2. A little more		14	15.2		
3. About average		47	51.1		
4. A little less		23	25.0		
5. Much less		5	5.4		
I feel that if I were not surrounded by competitors in an exam situation,	28†			3.30	.93
1. I would do much better		3	3.3		
2. I would do a little better		13	14.1		
3. It wouldn't make much difference		37	40.2		
4. I wouldn't do quite as well		31	33.7		
5. I wouldn't do anywhere as well		8	8.7		

†Items used in original AAT as "buffer items." N = 92.

The other four items, selected from the buffer items used in the original AAT, also are shown in Table 18. One (Item 25) refers to a physiological response, which is classified by some authors as "state anxiety" rather than specifically test anxiety (Spielburger, et al., 1976). This item, however, performed much like the other items and contributed adequately to the internal consistency of the scale. In fact, about 60 percent of the respondents stated that during a test they almost always or frequently are conscious of their heartbeat. Some subjects also reported that without competitors in an exam, they felt they might not do as well (42 percent), while another 40 percent thought it wouldn't make any difference. About half classified themselves as having about the average amount of harmful nervousness, but 3 percent said they had much more. When they felt confident about their test ability, again almost half reported that anxiety rarely or never bothered them.

Given that subjects scored similarly to other populations on the F and D Scales, possible interpretations of SF Scale responses should be of some interest. Accordingly, SF Scale item responses were further examined.

Chi-square tests of independence were calculated (See Appendix C) between responses to each item and the variables (1) year in school, (2) whether the course was required or elective, (3) self-reported GPA, (4) previous experience with KR, (5) whether subjects thought they would like KR, and (6) anxiety categories used in the study (ANXF). Two of the variables (GPA and ANXF) were related to responses on

several of the SF Scale items.

Subjects with higher reported GPA's (over 3.0) were more likely to respond to Item 20 that they were usually or often concerned that they must perform as well as everybody else or appear dumb (chi-square = 20.08, df = 8, $p \leq .01$). The same high GPA levels, and also the Facilitators, reported that during the test they "always" or "usually" thought about and dreaded to find out their test scores (Item 13). These associations were: chi-square = 17.08, df = 8, $p \leq .03$ for GPA, and chi-square = 13.46, df = 6, $p \leq .04$ for ANXF. Although more subjects in all of the ANXF categories reported that they almost always or often thought about their instructors being disappointed in their performance (Item 7), this was especially true of Facilitators and Least Affecteds (chi-square = 17.17, df = 6, $p \leq .01$). These responses are perhaps intuitively obvious, but the following responses are not. Facilitators and Least Affecteds also responded that they "always" or "usually" tended to feel helpless during a test (Item 22) while Debilitators said they felt this way only "sometimes" (chi-square = 20.23, df = 6, $p \leq .01$). And when asked whether they thought they had more or less than the average amount of harmful nervousness about tests (Item 27), most checked themselves as average, but Debilitators did not report themselves as having much or a little more, only average or less, and this was also apparent for Most Affecteds (chi-square = 26.59, df = 6, $p \leq .001$). These fairly pronounced responses suggest that students with high test anxiety of the harmful variety (Debilitators and to a degree Most Affecteds) may not

perceive themselves in the same way as do researchers in the field of text anxiety. Although the construct of test anxiety is thought to be similarly defined by students and psychologists, this may not be the case.

Thus, at the item level, responses on the SF Scale do identify certain types of individuals, but at the scale level, this is not apparent. The SF Scale was highly correlated with the D Scale ($r = .62$), indicating that subjects who scored high on the SF Scale tended to respond to provision of KR in a similar fashion as those who scored high on the D Scale. Likewise, responses to the anxiety, motivation, and perceived difficulty items should resemble those of D Scale subjects.

Correlations of the D Scale and the SF Scale with GPA were both negative and significant ($r = -.26$ and $-.22$, respectively; $p \leq .05$). Both were also negatively correlated with Test 2 scores, although SF Scale was less so ($r = -.20$ and $-.04$, respectively). A comparison of SF Scale means for those choosing the KR answer sheet for Test 3 and those choosing the no-KR answer sheet indicated no significant differences ($p \geq .20$).

Thus, there is no evidence to indicate that the SF Scale items added any information beyond that already provided by the D Scale. Although they were specifically intended to reflect the "self-focus" dimension described by Wine (1971), they were either not successful, or the D Scale is also reflecting self-focus, or perhaps Wine's (1971) suggestions did not sufficiently describe the reaction of the test

anxious subject. At any rate, although responses to some of the SF Scale items are of interest, the SF Scale did not serve to differentiate subjects with regard to the variables examined in the present study.

SUMMARY AND CONCLUSIONS

The purpose of this study was to examine the effects of test anxiety level and the provision of immediate knowledge of results (KR) during testing, on achievement test scores, when scores were being used to assign the course grades. It was hypothesized that, generally, students categorized as having "facilitative" test anxiety would show higher achievement scores than would students categorized as having "debilitative" test anxiety, but that the latter would show equal or better achievement when immediate KR was provided on the test. That is, the provision of immediate KR during testing would serve to focus the attention of certain testees on the task at hand and thereby improve their performances on achievement tests. In addition, the study was intended to examine whether there were characteristics besides test anxiety which might be indicative of a liking for or a personal choice to receive immediate KR during a final examination.

Subjects were 78 volunteers from among 104 registrants in two sections of an introductory nutrition course offered yearly at a small Catholic liberal arts college in central Minnesota. Data were

collected concerning each subject's college background (e.g., year in school, GPA) and previous experience in receiving immediate KR during testing. The Achievement Anxiety Test (Alpert and Haber, 1960) was administered at the beginning of the study, which included in addition to its regular nineteen items, nine items intended to measure a "self-focus" orientation as postulated by Wine (1971). AAT scores were used according to a variant of a procedure developed by Munz and Smouse (1968) to categorize participants into four anxiety types: Most Affecteds, Facilitators, Debilitators, and Least Affecteds. Members of each anxiety category were randomly assigned to one of three treatment groups, for receiving immediate KR on two of the three course exams: immediate KR on Test 1 but not on Test 2 (Group 1); immediate KR on Test 2 but not on Test 1 (Group 2); or no immediate KR (Group 3, or the Control group). Following Test 1 and Test 2, participants who had received KR responded to seven items (Betz and Weiss, 1976a) designed to assess reaction to its provision. Prior to Test 3, Groups 1 and 2 were requested to indicate whether or not they wanted immediate KR on Test 3. Following Test 3, all participants responded to ten items (Betz and Weiss, 1976a) designed to assess anxiety, motivation and perceived difficulty reactions to Test 3. Data analysis included analyses of variance of scores on the achievement tests, plus correlation analyses of background variables, responses to the reaction items, and choice of KR or no-KR format on Test 3. In addition, the investigation included examination of: (1) possible sample bias due to informed consent procedures, (2) influence of

achievement test reliability, (3) the method of categorization of AAT scores, (4) problems in the provision of immediate KR during pencil and paper tests, and (5) characteristics of the special "self-focus" items.

Results of the data analyses produced the following description of the subject population, and the subsequent results and conclusions:

Class registrants were primarily female nursing students in their sophomore and junior years with a mean GPA of 3.0 on a 4.0 basis and no prior experience with immediate KR in testing situations. AAT scores were similar to those of larger more heterogeneous populations of college undergraduates (Huck and Jack, 1974; Walsh, et al., 1978). The requirement for individual signed consent (Committee on Use of Human Subjects in Research, University of Minnesota) did not appear to cause the participant sample to be significantly different from the registrant sample with regard to year in school, self-reported GPA, prior experience with immediate KR, or AAT scores.

Conclusion #1. Reliability of measurement should be considered in interpreting study results. Achievement test performance was not significantly different for any of the categories of test anxiety (Most Affecteds, Facilitators, Debilitators, or Least Affecteds), either with or without immediate KR, when the analysis of variance was run on the more homogeneous test scores (Test 2, KR_{20} = .77; revised Test 1, KR_{20} = .63). Achievement test performance showed a significant main effect for immediate KR when using the less homogeneous set of scores (original Test 1, KR_{20} = .48). Many, if not most, authors of studies of test anxiety and performance have failed to report reli-

ability estimates for their dependent variable, the test scores. Since test scores of varying homogeneity can produce differing results, such reports should be interpreted with caution.

Conclusion #2. Subjects of this study did not show the differences in achievement test performance by anxiety type as reported by other authors. Although subjects apparently had no more or no less test anxiety than other subjects for whom AAT data were available, students in the four anxiety categories performed about the same on their classroom tests. Subjects in this study knew that their test scores would be used as a basis for a course grade, and their self-reported GPA's were relatively high, so it could be that these subjects were high achievers regardless of test anxiety. (This notion will be discussed further in Conclusion #4).

Conclusion #3. Provision of immediate KR did not produce significant differences in achievement test performance. There was, however, a pattern of score means for subjects receiving immediate KR, i.e., Debilitators and Most Affecteds scored higher, and Facilitators and Least Affecteds scored lower, than their counterparts in the groups who did not receive immediate KR. Thus, there was a suggestion that performance of students in the former categories might have been aided, while performance of students in the latter categories might have suffered somewhat when KR was provided. This suggestion could be worthy of further work, given that provision of immediate KR was a reasonable alternative testing procedure (See Conclusion #7).

Conclusion #4. Self-reported GPA explained a significant amount of the variance in the achievement test scores. The test anxiety

categories did not. The question of whether test anxiety significantly influences test performance remains far from resolved. Other authors (Alpert and Haber, 1960; S. Sarason, et al., 1960) have maintained that test anxiety measures explain variance beyond that related to ability, and one (S. Sarason) suggested that individual ability levels might determine how much an individual can do before feelings of anxiety depress performance. College undergraduates are often considered above average in ability, if not performance, and the subjects in this study reported fairly high GPA's. Moreover, item analysis procedures used on the classroom tests demonstrated that difficulty indexes were high (i.e., items were easy for the testees). Considering all these factors, one might conclude that most subjects in this study were still operating within their ability level and so did not experience enough test anxiety to depress their performance. Hence, GPA explained the test variance and anxiety category did not. Provision of immediate KR caused subjects to report high feelings of nervousness, interference with concentration, and increased effort. A "distinct minority" refused to have anything to do with immediate KR, but continued to express feelings of nervousness even without it. It could be that these subjects were approaching the point where feelings of anxiety would depress performance, but did not pass that point because the tests were not that difficult. More difficult tests and provision of immediate KR might be truly detrimental to the performance of such individuals. Attempts to determine whether strong feeling against immediate KR could be isolated by GPA or anxiety

category via chi-square tests were inconclusive, indicating that these attitudes were distributed through multiple levels. It could be that the "distinct minority" was made up of individuals in the Facilitators and Least Affecteds categories, whose mean performance on Test 2 under the condition of KR was slightly lower. A larger sample of subjects from which to categorize anxiety, and slightly increased numbers of observations per cell (e.g., 8-10) might serve to answer that question.

Conclusion #5. Liking for and choice of immediate KR was the reaction of a majority of subjects in the study. However, there seemed to be no identifying characteristics which could be ascribed to either those who did or those who did not. There were no significant statistical relationships between liking immediate KR and GPA, anxiety category, test performance, or previous experience with receiving KR. The same was true for choosing to receive KR. A majority of the subjects also reported increased nervousness and interference with concentration due to KR, but only about 28 percent said they would rather not know whether their answers are right or wrong, and/or elected not to receive KR on the third course exam.

Conclusion #6. Motivational aspects of immediate KR are far from clear. Several subjects in this study evidently found KR to be less than desirable, and those subjects who received KR performed about the same as those who did not receive it. If the achievement tests were "easy," it could be that motivational effects were not really tested. The question of whether positive or negative KR is the better motivator remains unsolved.

Conclusion #7. Problems with providing KR on pencil and paper tests are numerous, and not lightly dismissed. Although a majority of subjects in the present study reported that they "liked" KR, slightly over a quarter of them refused to try it a second time. The Action Mark sheets used in this study cost about $1.25 apiece; this cost could have been reduced by reworking answer choices so that they corresponded to those on mass-produced sheets costing about 4 to 12 cents apiece. Item answers must be carefully checked to avoid knowledge of results giving cues to another answer. Once constructed, any item changes may result in incorrect answer sheets, a condition particularly upsetting to testees. Further, testees also appeared to be upset by the fact that they themselves could not change an answer once it was marked. These latter factors tend to result in heavy time commitments for an instructor in preparing the test/answer sheets, and for a student in using the answer sheets. As with any test format which is to be used again, security could also be a problem. Computerized test administration would modify these considerations, but would hardly alleviate them, either in cost, time commitment, cues, or security (given the state of the art in breaching computerized data). Computer administered tests are becoming feasible, however, in which case, provision of immediate KR may be desirable, at least for the large standardized tests (Cf Betz and Weiss, 1976b).

Conclusion #8. The methodology for categorizing subjects according to AAT scores which was developed for this study (ANXF)

demonstrated no clear-cut superiority over that designated as ANXM, which was used by Munz and his colleagues. Although it should be the case that anxiety scores would be more homogeneous within a category using the ANXF methodology, and in fact most category standard deviations were somewhat smaller than those associated with the ANXM categories, there appeared to be little difference in the results obtained with either of them. Previous discussion has stated that in this study, subjects in the separate anxiety categories did not seem to perform much differently. Since all willing subjects were used, there was not much difference in many F Scale or D Scale scores assigned to one category or another. Also, all subjects found the tests relatively easy. Both of these factors undoubtedly acted to minimize differences due to the two categorization methods, and further study using a larger sample and more difficult tests would be necessary in order to assess comparison of ANXF and ANXM.

Conclusion #9. Items utilized to examine a "self-focus" orientation (SF Scale) provided some information at the item level about the subjects, but at the scale level, they performed very much like the D Scale of the AAT. That is, the D Scale and the SF Scale were found to be highly correlated ($r = .62$), and both were negatively correlated with GPA and with Test 2 achievement scores. At the item level, 41 percent of the respondents said that they usually feel helpless during a test, 48 percent said that they sometimes feel this way, and 7 percent said that they always do. These respondents proved to be Facilitators and Least Affecteds (always and usually) and Debilitators

(sometimes). Also, Debilitators and Most Affecteds perceived themselves as having average or less harmful test anxiety, while Facilitators and Least Affecteds reported they thought they had average or more. Thus, the construct of test anxiety may not be viewed by students in the same way that is viewed by researchers in the field. It is possible that individual item responses on the F Scale and the D Scale could offer other kinds of information, although these items tend to be less oriented toward feelings and refer more to the task, e.g., "When I start a test, nothing is able to distract me." (F Scale), and "Nervousness while taking an exam or test hinders me from doing well." (D Scale). It was not possible to draw conclusions on the importance of the item responses, and the SF Scale itself did not seem to produce results different from the D Scale with regard to effects of anxiety and immediate KR on test performance.

RECOMMENDATIONS FOR FURTHER STUDY

It would seem that questions suggested by the present study, and mentioned in the conclusions above, center around two major topics: (1) Is kind and/or amount of test anxiety really a major consideration in achievement test performance, and (2) Were the test items difficult enough to provide answers to (1)?

Both Boor (1972) and the present study found evidence that not all subjects on all tests exhibit significantly different performance attributable to the test anxiety construct. As suggested, level of ability may be a sufficient explanation. In order to test such an hypothesis, test difficulty would need to be controlled. Further,

homogeneous anxiety categories, in which mean scores were as different as possible from those of the other categories, would be essential.

The following experimental design is suggested:

	Test Difficulty Level 1	Test Difficulty Level 2
High Ability	N = 32	N = 32
Most Affecteds Facilitators Debilitators Least Affecteds		
Low Ability	N = 32	N = 32
Most Affecteds Facilitators Debilitators Least Affecteds		
		N = 128

In addition, it might be desirable to include provision of immediate KR in an attempt to further examine the results. Although it has been demonstrated by Betz and Weiss (1976a) that there are no carry-over effects from provision of immediate KR, the question of possible effects due to repeated use of KR has not been investigated. In other words, if students receive KR on tests routinely, until they become very familiar with the process, might provision of KR affect performance? (In the present study, some subjects did receive KR twice; their performance did not seem to have been affected, but, again, the tests were not difficult.) By utilizing the recommended experimental design on two groups of subjects, similar except for the fact that one group had received KR several times, or had actually

been trained in its usage, effects of KR could be more thoroughly examined. Such an investigation could also make possible some examination of so-called "motivational" effects of immediate KR that might be masked by lack of familiarity with the process. Particularly on a difficult test, receiving immediate KR might tell subjects something which their subjective feedback cannot, and hence they might be encouraged by positive KR (correct answers) and discouraged by negative KR (incorrect answers). Subjective reactions of the participants could be included, and it is further recommended that these pertain to issues raised by the SF Scale, e.g., feelings of helplessness, concern for the opinions of others, perceptions of personal reactions relative to others. The F and D Scale items themselves might also be individually examined for relationships to the experimental results.

In closing, the author is left with the suspicion that test anxiety might affect achievement test performance, but only for those whose ability no longer covers the level of difficulty being tested in a given situation, and only when that situation is perceived as important (as test grades usually are by college students). In a given content area, ability level may be fluid, because training in "how to study" almost invariably has been shown to improve test performance. The idea remains, however, that knowledge of results might be more effectively utilized prior to the testing situation, and that alleviation of "harmful" test anxiety might be better accomplished by the desensitization techniques of counseling psychologists.

REFERENCES

Alpert, R. and Haber, R. N. Anxiety in academic achievement situations. J. Abnorm. and Soc. Psych., 1960, 61, 207-215.

Beeson, R. O. Immediate knowledge of results and test performance. J. Educ. Res., 1973, 66, 224-226.

Betz, N. E. and Weiss, D. J. Effects of immediate knowledge of results and adaptive testing on ability test performance. (Research Report 76-3). Minneapolis: University of Minnesota, Dept. of Psychology, Psychometric Methods Program, 1976a.

Betz, N. E. and Weiss, D. J. Psychological effects of immediate knowledge of results and adaptive ability testing. (Research Report 76-4). Minneapolis: University of Minnesota, Department of Psychology, Psychometric Methods Program, 1976b.

Bierbaum, W. B. Immediate knowledge of performance on multiple-choice tests. J. Programmed Instruction, 1965, 3, 19-23.

Boor, M. Relationship of test anxiety and academic performance when controlled for intelligence. J. Clinical Psych., 1972, 28, 171-172.

Brown, F. G. Principles of Educational and Psychological Testing. 2nd Edition. New York: Holt, Rinehart and Winston, 1976.

Cronbach, L. J. Coefficient Alpha and the internal structure of tests. Psychometrika, 1951, 16, 297-334.

Gray, R. T. An evaluation of the effect of an immediate feedback device used with typical classroom tests. Project No. 6-8156, US Dept. Health, Education and Welfare, July, 1967. (ERIC Document Reproduction Service No. ED 015 658).

Huck, S. W. and Jacko, E. J. Effect of varying the response format of the Alpert-Haber Achievement Anxiety Test. J. Counseling Psych., 1974, 21, 159-163.

Item 66. Minneapolis: Research Division, General College, University of Minnesota, 1976.

Janisse, M. P. Test anxiety and choice of evaluation format in university students. Psych. in the Schools, 1973, 10, 350-353.

Kirk, R. E. Experimental Design: Procedures for the Behavioral Sciences. Belmont, California: Brooks/Cole Publishing Company, 1968.

Kulhavy, R. W. Feedback in written instruction. Review of Educ. Res., 1977, 47, 211-232.

Liebert, R. M. and Morris, L. W. Cognitive and emotional components of test anxiety: A distinction and some initial data. Psychol. Reports, 1967, 20, 975-978.

Mandler, G. and Sarason, S. B. A study of anxiety and learning. J. Abnormal and Soc. Psych., 1952, 47, 166-173.

McMahon, M. P. Effects of knowledge of ability test results on academic performance and test anxiety. J. Consult. Psych., 1973, 20, 247.

McKeachie, W. J. The decline and fall of the laws of learning. Educational Researcher, March, 1974, 3, 7-11.

Montor, K. Affect of using a self-scoring answer sheet on knowledge retention. J. Educ. Res., 1970, 63, 435-437.

Morris, L. W. and Fulmer, R. S. Test anxiety (worry and emotionality) changes during academic testing as a function of feedback and test importance. J. Educ. Psych., 1976, 68, 817-824.

Munz, D. C. and Smouse, A. D. Interaction effects of item-difficulty sequence and achievement-anxiety reaction on academic performance. J. Educ. Psych., 1968, 59, 370-374.

Munz, D. C., Costello, C. T. and Korabik, K. A further test of the inverted-U hypothesis relating achievement anxiety and academic test performance. J. Psych., 1975, 89, 39-47.

Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K. and Bent, D. H. Statistical Package for the Social Sciences. 2nd Edition. New York: McGraw Hill, 1975.

Osterhouse, R. A. Classroom anxiety and the examination performance of test-anxious students. J. Educ. Res., 1975, 68, 247-250.

Popham, W. J. The case for criterion-referenced measurements. Educational Researcher, December, 1978, 7, 6-10.

Pressey, S. L. Development and appraisal of devices providing immediate automatic scoring of objective tests and concomitant self-instruction. J. Psychol., 1950, 29, 417-447.

Sarason, I. G. Interrelationships among individual differences variables, behavior in psychotherapy, and verbal conditioning. J. Abnormal and Soc. Psych., 1958, 56, 339-344.

Sarason, S. B., Davidson, K. S., Lighthall, F. F., Waite, R. R. and Ruebush, B. K. Anxiety in Elementary School Children: A Report of Research. New York: Wiley, 1960.

Sarason, I. G., Pederson, A. M., Nyman, B. A. Test anxiety and the observation of models. J. Personality, 1968, 36, 493-511.

Scheffe, H. The Analysis of Variance. New York: Wiley, 1959.

Siegel, S. Nonparametric Statistics for the Social Sciences. New York: McGraw-Hill, 1956.

Spielberger, C. D., Anton, W. and Bedell, J. R. The nature and treatment of test anxiety. In: Emotions and Anxiety: New Concepts Methods and Applications. (Eds. Zuckerman, M. and Spielberger, C. D.) LEA-Wiley, New York, 1976.

Spielberger, C. D., Gorsuch, R. L. and Lushene, R. E. Manual for the State-Trait Anxiety Inventory. 1970. Cited in: Spielberger, C. D., Anton, W. And Bedel, J. R. The nature and treatment of test anxiety.

Strang, H. R. and Rust, J. O. The effects of immediate knowledge of results and task definition on multiple choice answering. J. Exp. Educ., 1973, 42, 77-80.

Suinn, R. M. The STABS, a measure of test anxiety for behavior therapy: Normative data. Cited in: Spielberger, C. D., Anton, W. and Bedel, J. R. The nature and treatment of test anxiety.

Sweeney, C. J., Smouse, A. D., Rupiper, O., and Munz, D. C. A test of the inverted-U hypothesis relating achievement anxiety and academic test performance. J. Psychol., 1970, 74, 267-273.

Wade, T. C. Relative effects on performance and motivation of self-motivating correct and incorrect responses. J. Exp. Psych., 1974, 103, 245-248.

Walsh, R. P., Engbretson, R. O. and O'Brien, B. A. Anxiety and test-taking behavior. J. Counseling Psychol., 1968, 15, 572-575.

Ward, R. P. and Prytula, R. E. Multiple-choice feedback by categorization of errors. Psych. Reports, 1976, 38, 223-227.

Weiss, D. J. The stratified adaptive computerized ability test. (Research Report 73-3). Minneapolis: University of Minnesota, Department of Psychology, Psychometric Methods Program, 1973. (AD 768376).

Wine, J. Test anxiety and direction of attention. Psychol. Bull., 1971, 76, 92-104.

APPENDIX A

COPIES OF FORMS AND QUESTIONNAIRES

FORM BD-1
DEVELOPED BY M. FRUIN

1	2	3

FEBRUARY, 1978

BACKGROUND DATA

INSTRUCTIONS: Please fill in the information below.

NAME _____ Sex: (circle one) M F (5)
last first

Year in school: (circle one) 1 2 3 4 Other _____ (6)
(please specify)

No. of semester hours of nutrition coursework you have completed to date _____(7-8)

What is your major field _____ (9)

Is this course (circle one) Required Elective (10)

What is your overall Grade Point Average _____ (be as accurate as you can) (11-13)

THANK YOU FOR YOUR HELP

THIS INFORMATION WILL BE CONVERTED TO A NUMBER CODE TO MAINTAIN CONFIDENTIALITY.

FORM BSE-1
DEVELOPED BY M. FRUIN

1	2	3

FEBRUARY, 1978

NAME _____

INSTRUCTIONS: The questions below refer to your past experience with taking classroom tests. This does not include programmed learning meterials, only tests. Please circle the number of the answer which best describes your situation.

1. Have you ever taken a test where you found out immediately if your answer was right or wrong? (Immediately means during the test and not after you had completed the entire test.)

   1) Yes, I have had a classroom test with immediate feedback.
   2) No, I have never had a classroom test with immediate feedback. (63)
   3) I cannot remember.

2. Do you think you would like to take a test which provides immediate feedback as to whether your answer is right or wrong?

   1) Yes, I definitely would
   2) I might like to
   3) I don't think so (64)
   4) No, I definitely wouldn't
   5) I am undecided

3. If you answered "Yes" to Question #1 (that you have had a classroom test with immediate feedback), please indicate approximately how many times you have had this kind of classroom test.

   _____ (65)

THANK YOU FOR YOUR HELP

THIS INFORMATION WILL BE CONVERTED TO A NUMBER CODE TO MAINTAIN CONFIDENTIALITY.

FEBRUARY, 1978

FORM AAT-2
(ALPERT & HABER)
DEVELOPED BY M. FRUIN

1	2	3

NAME:_____

INSTRUCTIONS: Read each of the items below and circle the answer which best describes HOW YOU USUALLY FEEL when you take a test. Please be sure to circle an answer for every item.

1. Nervousness while taking an exam or test hinders me from doing well. (15)
   a) Always
   b) Often
   c) Sometimes
   d) Rarely
   e) Never

2. I work most effectively under pressure, as when the task is very important. (16)
   a) Always
   b) Usually
   c) Sometimes
   d) Hardly ever
   e) Never

3. In a course where I have been doing poorly, my fear of a bad grade cuts down my efficiency. (17)
   a) Never
   b) Hardly ever
   c) Sometimes
   d) Usually
   e) Always

4. When I am taking a test, I often wonder how other people are doing. (18)
   a) This is usually true
   b) This is often true
   c) Sometimes
   d) This is hardly ever true
   e) Definitely not true

5. When I am poorly prepared for an exam or test, I get upset, and do less well than even my restricted knowledge should allow. (19)
   a) This never happens to me
   b) This hardly ever happens to me
   c) This sometimes happens to me
   d) This often happens to me
   e) This practically always happens to me

6. The more important the examination, the less well I seem to do. (20)
   a) Always
   b) Usually
   c) Sometimes
   d) Hardly ever
   e) Never

7. During a test I sometimes think about whether the instructor will be disappointed in my performance. (21)
   a) I almost always think of this
   b) I quite often think of this
   c) I sometimes think of this
   d) I hardly ever think of this
   e) I never think of this

8. When I feel confident about my ability to do well on the test, (22)
   a) anxiety does not bother me at all
   b) anxiety bothers me very rarely
   c) anxiety may still bother me sometimes
   d) I still often feel somewhat anxious
   e) I still feel very anxious

9. While I may (or may not) be nervous before taking an exam, once I start, I seem to forget to be nervous. (23)
   a) I always forget
   b) Usually
   c) Sometimes
   d) I often feel some nervousness
   e) I am always nervous during an exam

10. During exams or tests, I block on questions to which I know the answers, even though I might remember them as soon as the exam is over. (24)
   a) This always happens to me
   b) This often happens to me
   c) This sometimes happens to me
   d) This hardly ever happens to me
   e) I never block on questions to which I know the answer

11. Nervousness while taking a test helps me do better (25)
   a) It never helps
   b) It usually doesn't help
   c) Now and then it helps
   d) It generally helps me a little
   e) It often helps

12. When I start a test, nothing is able to distract me. (26)
   a) This is always true of me
   b) This is often true of me
   c) This is sometimes true of me
   d) This is hardly ever true of me
   e) This is not true of me

13. When I am taking a test, I find myself almost dreading to find out what my score will be when the test is graded and returned. (27)
   a) Always
   b) Usually
   c) Sometimes
   d) Hardly ever
   e) Never

14. In courses in which the total grade is based mainly on <u>one</u> exam, I seem to do better than other people. (28)
   a) Never
   b) Hardly ever
   c) Sometimes
   d) Quite often
   e) Almost always

15. I find that my mind goes blank at the beginning of an exam, and it takes me a few minutes before I can function. (29)
    a) I almost always blank out at first.
    b) I usually blank out at first
    c) I sometimes blank out at first
    d) I hardly ever blank out at first
    e) I never blank out at first

16. I look forward to exams. (30)
    a) Never
    b) Hardly ever
    c) Sometimes
    d) Usually
    e) Always

17. I am so tired from worrying about an exam, that I find I almost don't care how well I do by the time I start the test. (31)
    a) I never feel this way
    b) I hardly ever feel this way
    c) I sometimes feel this way
    d) I often feel this way
    e) I almost always feel this way

18. Time pressure on an exam causes me to do worse than the rest of the group under similar conditions. (32)
    a) Time pressure always seems to make me do worse on an exam than others
    b) Time pressure often seems to make me do worse on an exam than others
    c) Time pressure sometimes seems to make me do worse on an exam than others
    d) Time pressure hardly ever seems to make me do worse on an exam than others
    e) Time pressure never seems to make me do worse on an exam than others

19. Although "cramming" under pre-examination tension is not effective for most people, I find that if the need arises, I can learn material immediately before an exam, even under considerable pressure, and successfully retain it to use on the exam. (33)
    a) I am always able to use the "crammed" material successfully
    b) I am usually able to use the "crammed" material successfully
    c) I am sometimes able to use the "crammed" material successfully
    d) I am hardly ever able to use the "crammed" material successfully
    e) I am never able to use the "crammed" material successfully

20. During a test I get very concerned that I must perform as well as everybody else or they will think that I'm dumb. (34)
    a) This is usually true
    b) This is often true
    c) Sometimes
    d) This is hardly ever true
    e) Definitely not true

21. I enjoy taking a difficult exam more than an easy one. (35)
    a) Always
    b) Often
    c) Sometimes
    d) Rarely
    e) Never

22. During a test I tend to feel helpless. (36)
    a) Always
    b) Usually
    c) Sometimes
    d) Hardly Ever
    e) Never

23. I find myself reading exam questions without understanding them, and I must go back over them so that they will make sense. (37)
    a) Never
    b) Rarely
    c) Sometimes
    d) Often
    e) Almost always

24. The more important the exam or test, the better I seem to do. (38)
    a) This is true of me
    b) This is true of me much of the time
    c) This is sometimes true of me
    d) This is rarely true of me
    e) This is not true of me

25. During an exam or test, I become conscious of my heartbeat. (66)
    a) Almost always
    b) Frequently
    c) Sometimes
    d) Hardly ever
    e) Never

26. When I don't do well on a difficult item at the beginning of an exam, it tends to upset me so that I block on even easy questions later on. (67)
    a) This never happens to me
    b) This very rarely happens to me
    c) This sometimes happens to me
    d) This frequently happens to me
    e) This always happens to me

27. Relative to other students, I seem to have more (or less) than the average amount of harmful nervousness about tests and exams. (68)
    a) Much more
    b) A little more
    c) About average
    d) A little less
    e) Much less

28. I feel that if I were not surrounded by competitors in an exam situation, (69)
    a) I would do much better
    b) I would do a little better
    c) It wouldn't make much difference
    d) I wouldn't do quite as well
    e) I wouldn't do anywhere near as well

THANK YOU FOR YOUR HELP

THIS INFORMATION WILL BE CONVERTED TO A NUMBER CODE TO MAINTAIN CONFIDENTIALITY.

February, 1978

STUDY CONSENT FORM

You are invited to participate in a study of the desirability and efficiency of different methods of classroom testing. One method involves using a wax crayon to mark the answer; these answers cannot be changed.

Participants will be randomly assigned to the different methods being used for the regular classroom tests. In addition, I will need to collect a limited amount of background information regarding your work in college to date, and also some of your attitudes toward testing in general and your reaction to these testing methods after you work with them. The results of your classroom tests will be used by the course instructor to determine your grade in this course, regardless of whether you participate in the study. There exists the possibility that your performance may be affected, but at the present time it cannot be stated with any certainty whether the outcome will be beneficial, detrimental, or of no consequence.

Individual results will be identified only by a code number; no names will be available to anyone after the study is completed. The course instructor will not have access to student names on any information except the classroom tests themselves, and she will not know which testing method any individual has used. The written dissertation concerning the data will not identify any student and only aggregate results will be presented.

Your decision whether or not to participate will not prejudice your future relations with this class or with the College of St. Benedict.

Your signature indicates that you have read the information above and have decided to participate. You may withdraw at any time without prejudice after signing this form should you choose to discontinue participation in this study.

_____ _____

Signature Date

SELF-SCORING ANSWER SHEET - W/M

Name _____ Score _____

INSTRUCTIONS: Select your answer to each question. Rub wax crayon firmly three or four times across lettered box which corresponds to selected answer.
An X will appear if your answer is correct.
An O will appear if your answer is not correct.

When you finish, you may add up the number of correct answers (X) if you wish. This is your score on this part of the test. Return all answer sheets to the instructor.

MARK ONLY ONE BOX.

Try this example: 2 + 2 = ? a) 2 b) 4 c) 6

example: a b c d

WARNING: YOU CANNOT CHANGE YOUR ANSWERS!

	a	b	c	d		a	b	c	d		a	b	c	d
1	•				14					27				
2					15					28				
3					16					29				
4					17					30				
5					18					31				
6					19					32				
7					20					33				
8					21					34				
9					22					35				
10					23					36				
11					24					37				
12					25					38				
13					26					39				

40	57	74
41	58	75
42	59	76
43	60	77
44	61	78
45	62	79
46	63	80
47	64	81
48	65	82
49	66	83
50	67	84
51	68	85
52	69	86
53	70	87
54	71	88
55	72	89
56	73	90

FORM RQ-12
(BETZ & WEISS)
DEVELOPED BY M. FRUIN

1	2	3

MARCH, 1978

REACTION QUESTIONNAIRE

INSTRUCTIONS: Below are several questions which refer to how you felt while taking this test. Please read each item, and circle the number of the response which best describes your reaction. Work quickly but carefully, and please answer every question.

NAME: _____

1. Did getting feedback on this test make it more interesting or less interesting? (41)

   1) Much more interesting 2) Somewhat more interesting
   3) Didn't make any difference 4) Somewhat less interesting
   5) Much less interesting

2. Did receiving feedback after each question interfere with your ability to concentrate on the test? (42)

   1) No, not at all 2) Yes, somewhat 3) Yes, moderately so
   4) Yes, very much so

3. Did getting feedback after each question make you nervous? (43)

   1) No, not at all 2) Yes, somewhat 3) Yes, moderately so
   4) Yes, very much so

4. Did you try harder to get the questions right because you knew you would get feedback after each question? (44)

   1) No, not at all 2) Yes, somewhat 3) Yes, moderately so
   4) Yes, very much so

5. Were you interested in knowing whether your answers were right or wrong? (45)

   1) I was very interested 2) I was moderately interested
   3) I was somewhat interested 4) I didn't care at all

6. How did you feel when you found that your answers were incorrect? (46)

   1) It bothered me a lot
   2) It bothered me some
   3) It bothered me a little
   4) It didn't bother me at all

7. How do you feel about getting feedback? (47)

   1) I'd rather not know whether my answers were right or wrong
   2) I really don't care whether I get feedback or not
   3) I liked getting the feedback

THANK YOU FOR YOUR COOPERATION

THIS INFORMATION WILL BE CONVERTED TO A NUMBER CODE TO MAINTAIN CONFIDENTIALITY.

FORM FMT-1E
DEVELOPED BY M. FRUIN

1	2	3

MARCH, 1978

NAME: _____

INSTRUCTIONS: You have now had two tests -- one in which you were informed immediately whether or not your answer was right or wrong, and one in which you were not told until the sheet was graded and returned.

You may choose either one of the two methods for the third and final test. Please check which method you prefer.

_____ The procedure which tells me if the answer is right or wrong immediately. (52)

_____ The procedure which does not tell me if the answer is right or wrong until graded and returned.

THANK YOU FOR YOUR COOPERATION

THIS INFORMATION WILL BE CONVERTED TO A NUMBER CODE TO MAINTAIN CONFIDENTIALITY.

FORM FMT-1C
DEVELOPED BY M. FRUIN

1	2	3

MARCH, 1978

NAME: _____

INSTRUCTIONS: You have now had two of the three tests given in this course. Please read the items below and circle the number which best describes how you feel.

How well do you believe the tests in this course have measured what you have learned?

Very well _____ Not well

5 4 3 2 1

Generally speaking, how do you feel about the testing procedure used in this course as compared to tests you have had in other courses?

As good or better _____ Not as good

5 4 3 2 1

THANK YOU FOR YOUR HELP

THIS INFORMATION WILL BE CONVERTED TO A NUMBER CODE TO MAINTAIN CONFIDENTIALITY.

FORM RQ-3
(BETZ & WEISS)
DEVELOPED BY M. FRUIN

1	2	3

MARCH, 1978

REACTION QUESTIONNAIRE

INSTRUCTIONS: Below are several questions which refer to how you felt while taking this test. Please read each item, and circle the number of the response which best describes your reaction. Work quickly but carefully, and please answer every question.

NAME: _____

1. How often did you feel that the questions in the test were too easy for you? (53)
   1) Always 2) Frequently 3) Sometimes 4) Seldom 5) Never

2. During testing, did you worry about how well you would do? (54)
   1) Not at all 2) Somewhat 3) Fairly much so 4) Very much

3. How frequently were you careful to select what you thought was the best answer to each question? (55)
   1) Almost always 2) Frequently 3) Sometimes 4) Rarely 5) Never

4. Were you nervous while taking the test? (56)
   1) Not at all 2) Somewhat 3) Moderately so 4) Very much so

5. Do you think that you could have done better on the test if you had tried harder? (57)
   1) I definitely could have 2) I probably could have 3) I'm not sure
   4) I probably couldn't have 5) I definitely couldn't have

6. How did you feel while taking the test? (58)
   1) Very tense 2) Somewhat tense 3) Neither tense nor relaxed
   4) Somewhat relaxed 5) Very relaxed

7. Did you feel frustrated by the difficulty of the test questions? (59)
   1) Not at all 2) Somewhat 3) Fairly much so 4) Very much so

8. Did you feel challenged to do as well as you could on the test? (60)
   1) Not at all 2) Somewhat 3) Fairly much so 4) Very much so

9. How well do you feel you did on this test in comparison to your performance on other tests like this? (61)
   1) Much better 2) Somewhat better 3) About the same
   4) Somewhat worse 5) Much worse

10. Did you care how well you did on the test? (62)
   1) I cared a lot 2) I cared some 3) I cared a little
   4) I cared very little 5) I didn't care at all

THANK YOU FOR YOUR HELP

THIS INFORMATION WILL BE CONVERTED TO A NUMBER CODE TO MAINTAIN CONFIDENTIALITY

APPENDIX B

ACHIEVEMENT AND ANXIETY SCORES BY INDIVIDUAL FOR TREATMENT GROUPS

Achievement and Anxiety Scores by Individual for GROUP 1.

CASE-NO	IDNO	T1REV	T3REV2	TEST1	TEST2	TEST3	FSCALE	DSCALE	SFSCALE
1	5.	44.	47.	69.	77.	78.	19.	27.	21.
2	7.	45.	47.	71.	78.	77.	31.	22.	17.
3	14.	43.	40.	69.	73.	69.	23.	21.	21.
4	16.	41.	44.	68.	75.	75.	17.	34.	34.
5	17.	49.	45.	72.	76.	74.	24.	28.	20.
6	22.	48.	48.	72.	76.	76.	26.	31.	24.
7	23.	45.	43.	69.	77.	70.	26.	30.	20.
8	27.	51.	43.	73.	79.	73.	22.	28.	21.
9	28.	49.	51.	75.	72.	80.	33.	30.	17.
10	32.	46.	42.	68.	74.	71.	18.	36.	28.
11	54.	35.	34.	60.	58.	65.	21.	32.	30.
12	55.	43.	45.	68.	71.	74.	29.	29.	24.
13	58.	46.	49.	69.	76.	79.	28.	27.	27.
14	61.	46.	45.	73.	73.	70.	30.	32.	23.
15	63.	43.	44.	67.	76.	73.	26.	24.	22.
16	67.	47.	42.	74.	75.	70.	21.	33.	24.
17	69.	47.	49.	73.	82.	79.	24.	34.	28.
18	72.	45.	43.	69.	74.	72.	22.	39.	34.
19	73.	45.	42.	71.	68.	69.	23.	37.	22.
20	74.	44.	41.	72.	81.	70.	22.	30.	31.
21	76.	47.	49.	71.	77.	77.	27.	26.	13.
22	78.	45.	-0	65.	77.	73.	25.	31.	26.
23	82.	43.	53.	61.	77.	81.	27.	24.	25.
24	88.	46.	47.	72.	76.	76.	24.	27.	23.
25	92.	44.	40.	70.	73.	70.	23.	30.	27.
26	94.	46.	50.	72.	77.	78.	23.	34.	23.
27	95.	34.	-0	55.	-0	-0	22.	28.	25.

NOTE: T1REV is the revised Test 1; T3REV2 is revised Test 3.

Achievement and Anxiety Scores by Individual for GROUP 2.

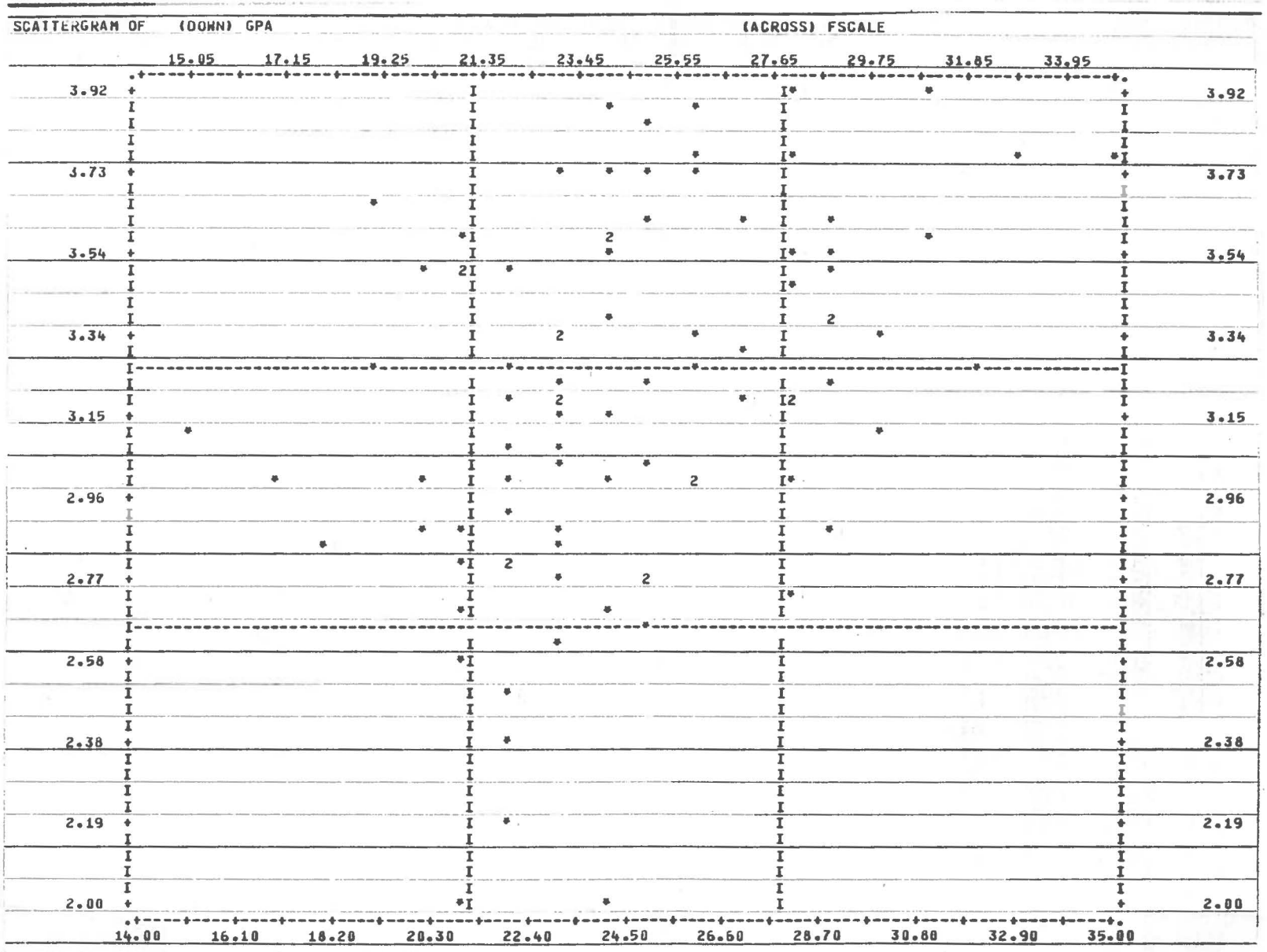
CASE-NO	IDNO	T1REV	T3REV2	TEST1	TEST2	TEST3	FSCALE	DSCALE	SFSCALE
1	1.	49.	45.	74.	70.	74.	35.	19.	21.
2	3.	43.	49.	69.	70.	77.	24.	40.	33.
3	4.	41.	38.	67.	71.	67.	22.	35.	33.
4	9.	44.	46.	72.	72.	75.	28.	27.	28.
5	10.	44.	49.	70.	78.	77.	27.	33.	31.
6	12.	49.	46.	75.	77.	75.	28.	30.	31.
7	20.	46.	45.	71.	76.	75.	24.	33.	26.
8	21.	48.	47.	74.	80.	75.	26.	36.	24.
9	24.	47.	46.	72.	77.	76.	23.	26.	20.
10	25.	46.	36.	71.	73.	67.	28.	25.	26.
11	31.	46.	44.	72.	80.	72.	22.	38.	36.
12	33.	48.	48.	74.	76.	77.	24.	35.	35.
13	51.	49.	45.	76.	76.	72.	23.	32.	26.
14	52.	42.	47.	65.	77.	76.	28.	24.	18.
15	57.	45.	49.	68.	81.	78.	22.	31.	28.
16	59.	48.	41.	73.	65.	69.	23.	30.	19.
17	64.	42.	44.	67.	76.	73.	23.	33.	26.
18	65.	50.	51.	76.	75.	80.	19.	29.	21.
19	70.	41.	41.	68.	76.	69.	23.	27.	25.
20	75.	46.	46.	73.	73.	75.	28.	28.	23.
21	80.	49.	50.	77.	81.	76.	21.	21.	21.
22	81.	50.	49.	77.	82.	76.	24.	29.	19.
23	85.	48.	48.	78.	76.	75.	21.	28.	28.
24	86.	50.	48.	75.	78.	74.	23.	29.	24.
25	89.	49.	47.	74.	80.	77.	25.	19.	12.
26	91.	46.	40.	67.	71.	69.	26.	31.	28.
27	93.	45.	43.	72.	80.	72.	21.	34.	36.

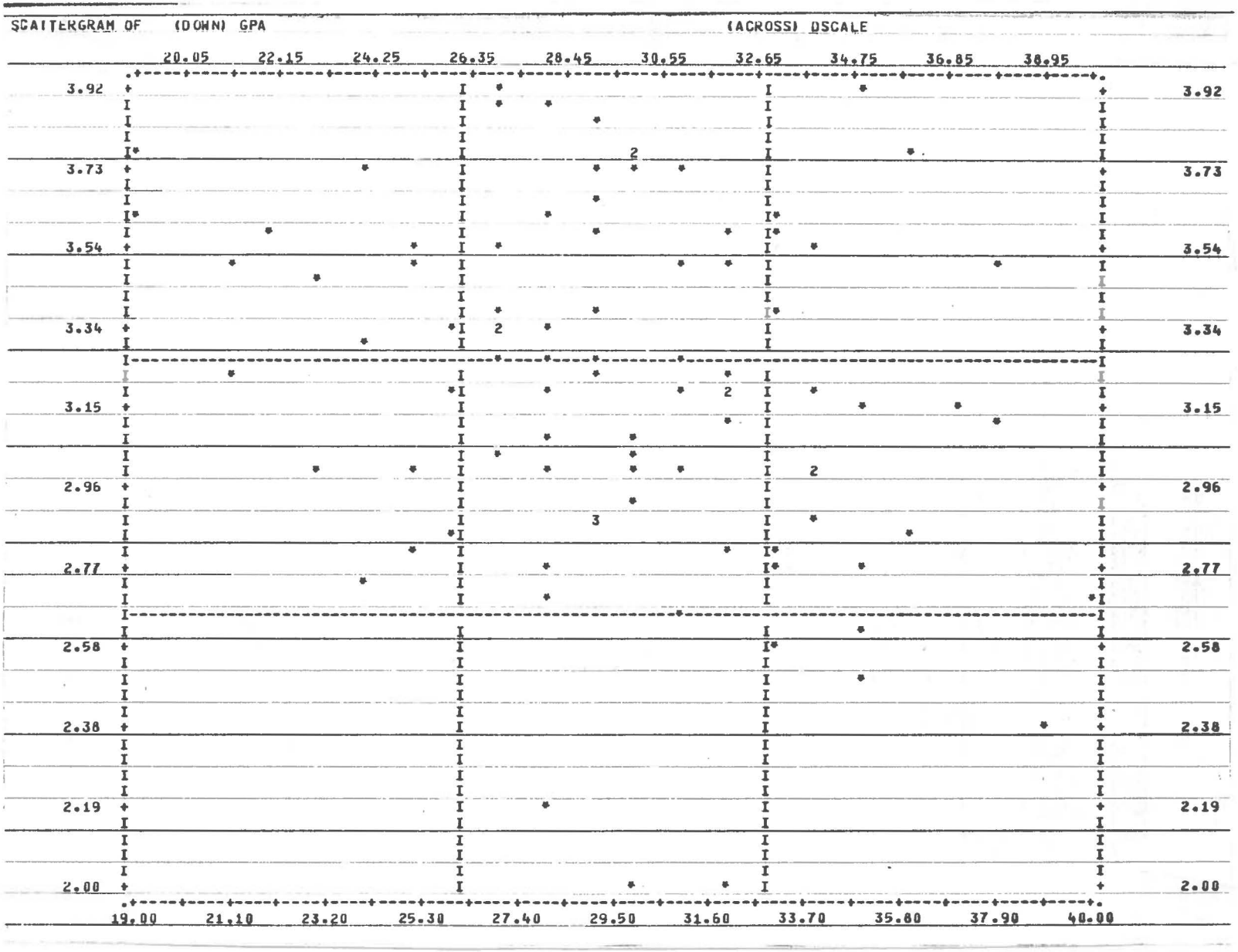
NOTE: T1REV is the revised Test 1; T3REV2 is revised Test 3.

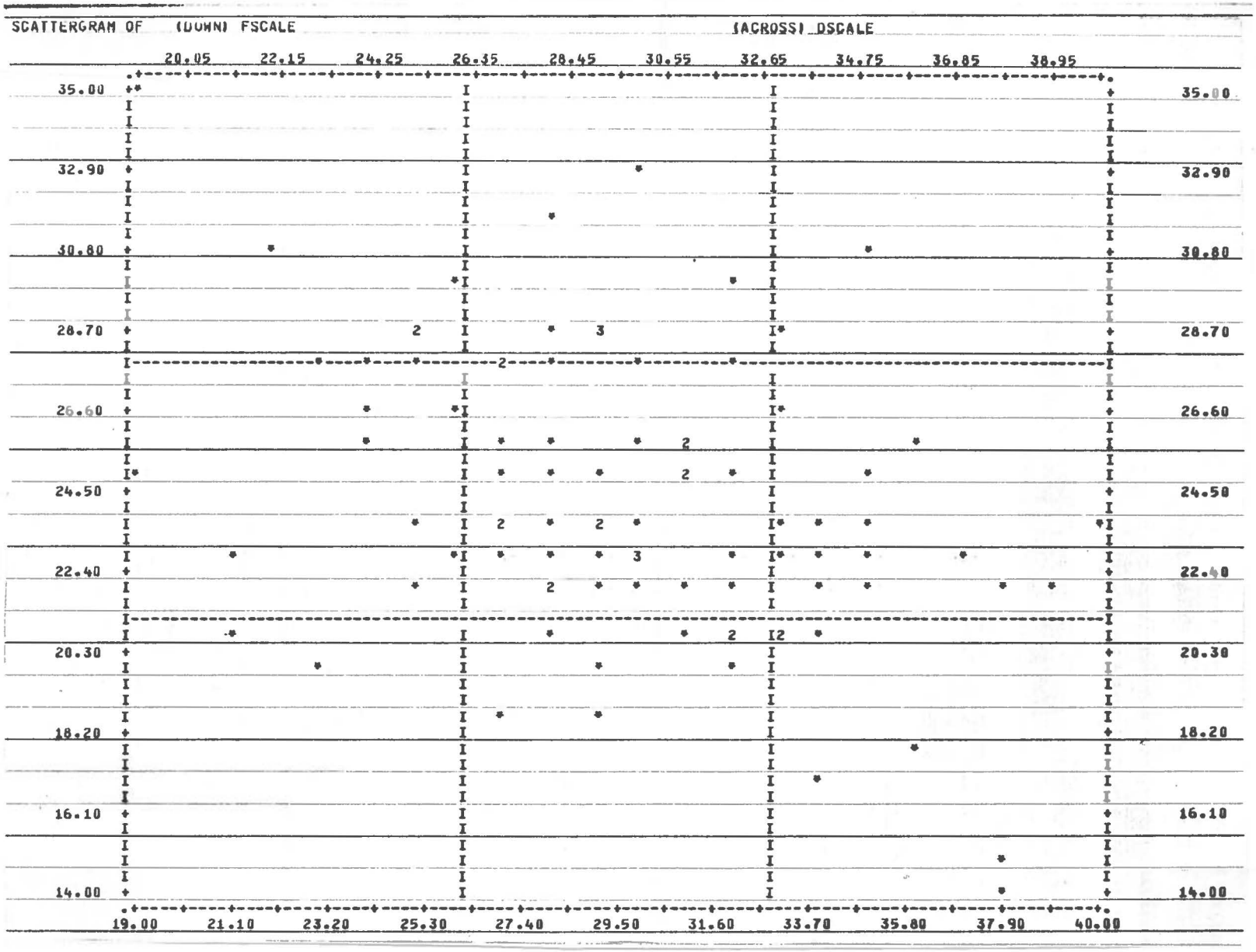
Achievement and Anxiety Scores by Individual for GROUP 3.

CASE-NO	IDNO	T1REV	T3REV2	TEST1	TEST2	TEST3	FSCALE	DSCALE	SFSCALE
1	2.	47.	45.	73.	80.	75.	24.	29.	23.
2	6.	47.	46.	73.	76.	72.	22.	34.	22.
3	8.	47.	43.	72.	78.	71.	22.	29.	21.
4	11.	46.	51.	72.	81.	80.	32.	28.	27.
5	13.	45.	43.	70.	81.	71.	25.	29.	27.
6	15.	41.	40.	66.	72.	67.	25.	35.	30.
7	18.	47.	44.	73.	80.	73.	29.	33.	36.
8	19.	44.	36.	70.	70.	65.	29.	29.	22.
9	26.	41.	47.	68.	73.	73.	29.	29.	26.
10	29.	42.	46.	68.	78.	75.	29.	28.	22.
11	30.	48.	48.	73.	77.	77.	23.	28.	19.
12	34.	44.	43.	74.	75.	73.	29.	25.	20.
13	53.	49.	51.	77.	82.	81.	25.	32.	26.
14	56.	49.	48.	78.	83.	78.	25.	31.	19.
15	61.	48.	48.	74.	79.	78.	20.	23.	20.
16	62.	43.	39.	71.	64.	68.	20.	29.	26.
17	66.	47.	52.	73.	79.	80.	29.	25.	22.
18	68.	46.	50.	69.	62.	77.	23.	35.	24.
19	71.	47.	41.	73.	69.	69.	20.	32.	30.
20	77.	37.	37.	61.	58.	65.	14.	38.	24.
21	79.	47.	50.	73.	80.	77.	26.	27.	21.
22	83.	44.	50.	62.	79.	77.	25.	28.	26.
23	84.	50.	46.	74.	75.	75.	21.	31.	21.
24	87.	50.	49.	76.	81.	78.	21.	32.	26.
25	90.	41.	37.	68.	72.	68.	22.	25.	17.

NOTE: T1REV is the revised Test 1; T3REV2 is revised Test 3.


SCATTERGRAM OF (DOWN) GPA (ACROSS) FSCALE
15.05 17.15 19.25 21.35 23.45 25.55 27.65 29.75 31.85 33.95
3.92
3.73
3.54
3.34
3.15
2.96
2.77
2.58
2.38
2.19
2.00
14.00 16.10 18.20 20.30 22.40 24.50 26.60 28.70 30.80 32.90 35.00


SCATTERGRAM OF (DOWN) GPA
(ACROSS) DSCALE
20.05
22.15
24.25
26.35
28.45
30.55
32.65
34.75
36.85
38.95
3.92
3.73
3.54
3.34
3.15
2.96
2.77
2.58
2.38
2.19
2.00
19.00
21.10
23.20
25.30
27.40
29.50
31.60
33.70
35.80
37.90
40.00


SCATTERGRAM OF (DOWN) FSCALE
(ACROSS) DSCALE
20.05
22.15
24.25
26.35
28.45
30.55
32.65
34.75
36.85
38.95
35.00
32.90
30.80
28.70
26.60
24.50
22.40
20.30
18.20
16.10
14.00
19.00
21.10
23.20
25.30
27.40
29.50
31.60
33.70
35.80
37.90
40.00

APPENDIX C

CHI-SQUARE TESTS OF INDEPENDENCE

CHI-SQUARE TESTS OF INDEPENDENCE:
Participants vs Non-Participants

	COUNT / ROW PCT / COL PCT / TOT PCT	NON PART	PART	ROW TOTAL
YR		1	2	
1		11	39	50
		22.0	78.0	54.3
		84.6	49.4	
		12.0	42.4	
2		2	40	42
		4.8	95.2	45.7
		15.4	50.6	
		2.2	43.5	
COLUMN TOTAL		13	79	92
		14.1	85.9	100.0

CORRECTED CHI SQUARE = 4.25963 SIGNIFICANCE = .0390

	COUNT / ROW PCT / COL PCT / TOT PCT	NON PART	PART	ROW TOTAL
REGCRS		1	2	
1		12	51	63
		19.0	81.0	68.5
		92.3	64.6	
		13.0	55.4	
2		1	28	29
		3.4	96.6	31.5
		7.7	35.4	
		1.1	30.4	
COLUMN TOTAL		13	79	92
		14.1	85.9	100.0

CORRECTED CHI SQUARE = 2.80075 SIGNIFICANCE = .0942

GPA		NON PART 1	PART 2	ROW TOTAL
UNDER 2.0	1	1	1	2
		50.0	50.0	2.2
		7.7	1.3	
		1.1	1.1	
2.0 TO 2.49	2	1	3	4
		25.0	75.0	4.3
		7.7	3.8	
		1.1	3.3	
2.5 TO 2.99	3	2	18	20
		10.0	90.0	21.7
		15.4	22.8	
		2.2	19.6	
3.0 TO 3.49	4	5	32	37
		13.5	86.5	40.2
		38.5	40.5	
		5.4	34.8	
OVER 3.5	5	4	25	29
		13.8	86.2	31.5
		30.8	31.6	
		4.3	27.2	
COLUMN TOTAL		13	79	92
		14.1	85.9	100.0

RAW CHI SQUARE = 2.80576 SIGNIFICANCE = .5908

HAD KR	COUNT / ROW PCT / COL PCT / TOT PCT	NON PART (1)	PART (2)	ROW TOTAL
1		2	16	18
YES		11.1	88.9	20.0
		15.4	20.8	
		2.2	17.8	
2		11	61	72
NO		15.3	84.7	80.0
		84.6	79.2	
		12.2	67.8	
COLUMN TOTAL		13	77	90
		14.4	85.6	100.0

CORRECTED CHI_SQUARE = .00562 SIGNIFICANCE = .9402,

WOULD LIKE KR	COUNT / ROW PCT / COL PCT / TOT PCT	NON PART (1)	PART (2)	ROW TOTAL
1		5	23	28
DEFINITELY		17.9	82.1	31.5
		38.5	30.3	
		5.6	25.8	
2		2	30	32
MAYBE		6.3	93.8	36.0
		15.4	39.5	
		2.2	33.7	
3		4	16	20
DOUBTFUL		20.0	80.0	22.5
		30.8	21.1	
		4.5	18.0	
4		2	7	9
DEFINITELY NOT		22.2	77.8	10.1
		15.4	9.2	
		2.2	7.9	
COLUMN TOTAL		13	76	89
		14.6	85.4	100.0

RAW CHI SQUARE = 2.91365 SIGNIFICANCE = .4051:

CHI-SQUARE TESTS OF INDEPENDENCE:
Response to Provision of Immediate KR

PEA1

YR		1.	2.	ROW TOTAL
1.	COUNT	30	1	31
	ROW PCT	96.8	3.2	57.4
	COL PCT	57.7	50.0	
	TOT PCT	55.6	1.9	
2.	COUNT	22	1	23
	ROW PCT	95.7	4.3	42.6
	COL PCT	42.3	50.0	
	TOT PCT	40.7	1.9	
COLUMN TOTAL		52	2	54
		96.3	3.7	100.0

CORRECTED CHI SQUARE = .26289 SIGNIFICANCE = .6081

PEA2

YR		1.	2.	ROW TOTAL
1.	COUNT	9	22	31
	ROW PCT	29.0	71.0	57.4
	COL PCT	50.0	61.1	
	TOT PCT	16.7	40.7	
2.	COUNT	9	14	23
	ROW PCT	39.1	60.9	42.6
	COL PCT	50.0	38.9	
	TOT PCT	16.7	25.9	
COLUMN TOTAL		18	36	54
		33.3	66.7	100.0

CORRECTED CHI SQUARE = .23668 SIGNIFICANCE = .6266

YR	REA3	1.	2.	ROW TOTAL
1.	COUNT	3	28	31
	ROW PCT	9.7	90.3	57.4
	COL PCT	60.0	57.1	
	TOT PCT	5.6	51.9	
2.	COUNT	2	21	23
	ROW PCT	8.7	91.3	42.6
	COL PCT	40.0	42.9	
	TOT PCT	3.7	38.9	
COLUMN TOTAL		5 9.3	49 90.7	54 100.0

CORRECTED CHI SQUARE = .12365 SIGNIFICANCE = .7251

YR	REA4	1.	2.	ROW TOTAL
1.	COUNT	3	28	31
	ROW PCT	9.7	90.3	57.4
	COL PCT	50.0	58.3	
	TOT PCT	5.6	51.9	
2.	COUNT	3	20	23
	ROW PCT	13.0	87.0	42.6
	COL PCT	50.0	41.7	
	TOT PCT	5.6	37.0	
COLUMN TOTAL		6 11.1	48 88.9	54 100.0

CORRECTED CHI SQUARE = .00237 SIGNIFICANCE = .9612

YR	REA5 1.	REA5 2.	ROW TOTAL
1.	29	2	31
	93.5	6.5	57.4
	55.8	100.0	
	53.7	3.7	
2.	23	0	23
	100.0	0	42.6
	44.2	0	
	42.6	0	
COLUMN TOTAL	52	2	54
	96.3	3.7	100.0

CORRECTED CHI SQUARE = .26289 SIGNIFICANCE = .6081

YR	REA7 1.	REA7 2.	ROW TOTAL
1.	10	21	31
	32.3	67.7	57.4
	66.7	53.8	
	18.5	38.9	
2.	5	18	23
	21.7	78.3	42.6
	33.3	46.2	
	9.3	33.3	
COLUMN TOTAL	15	39	54
	27.8	72.2	100.0

CORRECTED CHI SQUARE = .29828 SIGNIFICANCE = .5850

KR (continued)

		READ1		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
READRS				
1.		34	2	36
		94.4	5.6	66.7
		65.4	100.0	
		63.0	3.7	
2.		18	0	18
		100.0	0	33.3
		34.6	0	
		33.3	0	
COLUMN TOTAL		52	2	54
		96.3	3.7	100.0

CORRECTED CHI SQUARE = .06490 SIGNIFICANCE = .7989

		READ2		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
READRS				
1.		12	24	36
		33.3	66.7	66.7
		66.7	66.7	
		22.2	44.4	
2.		6	12	18
		33.3	66.7	33.3
		33.3	33.3	
		11.1	22.2	
COLUMN TOTAL		18	36	54
		33.3	66.7	100.0

CORRECTED CHI SQUARE = .09375 SIGNIFICANCE = .7595

		REA3		
	COUNT	1.	2.	ROW TOTAL
	ROW PCT			
	COL PCT			
REQCRS	TOT PCT			
1.		4	32	36
		11.1	88.9	66.7
		80.0	65.3	
		7.4	59.3	
2.		1	17	18
		5.6	94.4	33.3
		20.0	34.7	
		1.9	31.5	
COLUMN TOTAL		5	49	54
		9.3	90.7	100.0

CORRECTED CHI SQUARE = .02755 SIGNIFICANCE = .8682

		REA4		
	COUNT	1.	2.	ROW TOTAL
	ROW PCT			
	COL PCT			
REQCRS	TOT PCT			
1.		3	33	36
		8.3	91.7	66.7
		50.0	68.8	
		5.6	61.1	
2.		3	15	18
		16.7	83.3	33.3
		50.0	31.3	
		5.6	27.8	
COLUMN TOTAL		6	48	54
		11.1	88.9	100.0

CORRECTED CHI SQUARE = .21094 SIGNIFICANCE = .6460

		PEA5		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
REOCRS				
1.		34	2	36
		94.4	5.6	66.7
		65.4	100.0	
		63.0	3.7	
2.		18	0	18
		100.0	0	33.3
		34.6	0	
		33.3	0	
COLUMN TOTAL		52	2	54
		96.3	3.7	100.0

CORRECTED CHI SQUARE = .06490 SIGNIFICANCE = .7989

		PEA7		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
REOCRS				
1.		11	25	36
		30.6	69.4	66.7
		73.3	64.1	
		20.4	46.3	
2.		4	14	18
		22.2	77.8	33.3
		26.7	35.9	
		7.4	25.9	
COLUMN TOTAL		15	39	54
		27.8	72.2	100.0

CORRECTED CHI SQUARE = .10385 SIGNIFICANCE = .7473

HADKR	PEA1 1.	PEA1 2.	ROW TOTAL
1.	12	0	12
	100.0	0	22.2
	23.1	0	
	22.2	0	
2.	40	2	42
	95.2	4.8	77.8
	76.9	100.0	
	74.1	3.7	
COLUMN TOTAL	52	2	54
	96.3	3.7	100.0

CORRECTED CHI SQUARE = .00927 SIGNIFICANCE = .9233

HADKR	PEA2 1.	PEA2 2.	ROW TOTAL
1.	4	8	12
	33.3	66.7	22.2
	22.2	22.2	
	7.4	14.8	
2.	14	28	42
	33.3	66.7	77.8
	77.8	77.8	
	25.9	51.9	
COLUMN TOTAL	18	36	54
	33.3	66.7	100.0

CORRECTED CHI SQUARE = .12054 SIGNIFICANCE = .7285

HADKR	REA3 1.	REA3 2.	ROW TOTAL
1.	1	11	12
	8.3	91.7	22.2
	20.0	22.4	
	1.9	20.4	
2.	4	39	42
	9.5	90.5	77.8
	80.0	77.6	
	7.4	70.4	
COLUMN TOTAL	5	49	54
	9.3	90.7	100.0

CORRECTED CHI SQUARE = .19296 SIGNIFICANCE = .6606

HADKR	REA4 1.	REA4 2.	ROW TOTAL
1.	0	12	12
	0	100.0	22.2
	0	25.0	
	0	22.2	
2.	6	36	42
	14.3	85.7	77.8
	100.0	75.0	
	11.1	66.7	
COLUMN TOTAL	6	48	54
	11.1	88.9	100.0

CORRECTED CHI SQUARE = .75335 SIGNIFICANCE = .3854

HADKR	READ5 1.	READ5 2.	ROW TOTAL
1.	12	0	12
	100.0	0	22.2
	23.1	0	
	22.2	0	
2.	40	2	42
	95.2	4.8	77.8
	76.9	100.0	
	74.1	3.7	
COLUMN TOTAL	52	2	54
	96.3	3.7	100.0

CORRECTED CHI SQUARE = .00927 SIGNIFICANCE = .9233

HADKR	READ7 1.	READ7 2.	ROW TOTAL
1.	1	11	12
	8.3	91.7	22.2
	6.7	28.2	
	1.9	20.4	
2.	14	28	42
	33.3	66.7	77.8
	93.3	71.8	
	25.9	51.9	
COLUMN TOTAL	15	39	54
	27.8	72.2	100.0

CORRECTED CHI SQUARE = 1.79505 SIGNIFICANCE = .1803

		REA1		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
LIKEKR				
1.		36	2	38
		94.7	5.3	70.4
		69.2	100.0	
		66.7	3.7	
2.		16	0	16
		100.0	0	29.6
		30.8	0	
		29.6	0	
COLUMN TOTAL		52	2	54
		96.3	3.7	100.0

CORRECTED CHI SQUARE = .02135 SIGNIFICANCE = .8838

		REA2		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
LIKEKR				
1.		10	28	38
		26.3	73.7	70.4
		55.6	77.8	
		18.5	51.9	
2.		8	8	16
		50.0	50.0	29.6
		44.4	22.2	
		14.8	14.8	
COLUMN TOTAL		18	36	54
		33.3	66.7	100.0

CORRECTED CHI SQUARE = 1.87623 SIGNIFICANCE = .1708

KR (continued)

LIKEKR	REA3	1.	2.	ROW TOTAL
1.	COUNT	2	36	38
	ROW PCT	5.3	94.7	70.4
	COL PCT	40.0	73.5	
	TOT PCT	3.7	66.7	
2.	COUNT	3	13	16
	ROW PCT	18.8	81.3	29.6
	COL PCT	60.0	26.5	
	TOT PCT	5.6	24.1	
COLUMN TOTAL		5 9.3	49 90.7	54 100.0

CORRECTED CHI SQUARE = 1.09660 SIGNIFICANCE = .2950

LIKEKR	REA4	1.	2.	ROW TOTAL
1.	COUNT	5	33	38
	ROW PCT	13.2	86.8	70.4
	COL PCT	83.3	68.8	
	TOT PCT	9.3	61.1	
2.	COUNT	1	15	16
	ROW PCT	6.3	93.8	29.6
	COL PCT	16.7	31.3	
	TOT PCT	1.9	27.8	
COLUMN TOTAL		6 11.1	48 88.9	54 100.0

CORRECTED CHI SQUARE = .06939 SIGNIFICANCE = .7922

LIKEKR	REA5 1.	REA5 2.	ROW TOTAL
1.	37	1	38
	97.4	2.6	70.4
	71.2	50.0	
	68.5	1.9	
2.	15	1	16
	93.8	6.3	29.6
	28.8	50.0	
	27.8	1.9	
COLUMN TOTAL	52	2	54
	96.3	3.7	100.0

CORRECTED CHI SQUARE = .02135 SIGNIFICANCE = .8838

LIKEKR	REA7 1.	REA7 2.	ROW TOTAL
1.	10	28	38
	26.3	73.7	70.4
	66.7	71.8	
	18.5	51.9	
2.	5	11	16
	31.3	68.8	29.6
	33.3	28.2	
	9.3	20.4	
COLUMN TOTAL	15	39	54
	27.8	72.2	100.0

CORRECTED CHI SQUARE = .00137 SIGNIFICANCE = .9705

REA1	ANXF	1 IMOST AFFECTED	2 A FACILITATORS	3 DEBILITATORS	4 LEAST AFFECTED	ROW TOTAL
1	COUNT	18	22	18	19	77
	ROW PCT	23.4	28.6	23.4	24.7	97.5
	COL PCT	100.0	100.0	90.0	100.0	
	TOT PCT	22.8	27.8	22.8	24.1	
2	COUNT	0	0	2	0	2
	ROW PCT	0	0	100.0	0	2.5
	COL PCT	0	0	10.0	0	
	TOT PCT	0	0	2.5	0	
COLUMN TOTAL		18 22.8	22 27.8	20 25.3	19 24.1	79 100.0

RAW CHI_SQUARE = 6.05325 SIGNIFICANCE = .1091

REA2	ANXF	1 IMOST AFFECTED	2 A FACILITATORS	3 DEBILITATORS	4 LEAST AFFECTED	ROW TOTAL
1	COUNT	4	4	5	5	18
	ROW PCT	22.2	22.2	27.8	27.8	33.3
	COL PCT	33.3	26.7	35.7	38.5	
	TOT PCT	7.4	7.4	9.3	9.3	
2	COUNT	8	11	9	8	36
	ROW PCT	22.2	30.6	25.0	22.2	66.7
	COL PCT	66.7	73.3	64.3	61.5	
	TOT PCT	14.8	20.4	16.7	14.8	
COLUMN TOTAL		12 22.2	15 27.8	14 25.9	13 24.1	54 100.0

RAW CHI_SQUARE = .48956 SIGNIFICANCE = .9212

REA3	ANXF COUNT ROW PCT COL PCT TOT PCT	MOST AFFECTED	A FACILITATORS	DEBILITATORS	LEAST AFFECTED	ROW TOTAL
		1	2	3	4	
1		0	2	2	1	5
		0	40.0	40.0	20.0	9.3
		0	13.3	14.3	7.7	
		0	3.7	3.7	1.9	
2		12	13	12	12	49
		24.5	26.5	24.5	24.5	90.7
		100.0	86.7	85.7	92.3	
		22.2	24.1	22.2	22.2	
COLUMN TOTAL		12 22.2	15 27.8	14 25.9	13 24.1	54 100.0

RAW CHI SQUARE = 1.97980 SIGNIFICANCE = .5766

REA4	ANXF COUNT ROW PCT COL PCT TOT PCT	MOST AFFECTED	A FACILITATORS	DEBILITATORS	LEAST AFFECTED	ROW TOTAL
		1	2	3	4	
1		3	2	1	0	6
		50.0	33.3	16.7	0	11.1
		25.0	13.3	7.1	0	
		5.6	3.7	1.9	0	
2		9	13	13	13	48
		18.8	27.1	27.1	27.1	88.9
		75.0	86.7	92.9	100.0	
		16.7	24.1	24.1	24.1	
COLUMN TOTAL		12 22.2	15 27.8	14 25.9	13 24.1	54 100.0

RAW CHI SQUARE = 4.26696 SIGNIFICANCE = .2340

REA5	ANXF COUNT / ROW PCT / COL PCT / TOT PCT	1 MOST AFFECTED	2 FACILITATORS	3 DEBILITATORS	4 LEAST AFFECTED	ROW TOTAL
1		17	22	19	19	77
		22.1	28.6	24.7	24.7	97.5
		94.4	100.0	95.0	100.0	
		21.5	27.8	24.1	24.1	
2		1	0	1	0	2
		50.0	0	50.0	0	2.5
		5.6	0	5.0	0	
		1.3	0	1.3	0	
COLUMN TOTAL		18 22.8	22 27.8	20 25.3	19 24.1	79 100.0

RAW CHI SQUARE = 2.22579 SIGNIFICANCE = .5269

REA7	ANXF COUNT / ROW PCT / COL PCT / TOT PCT	1 MOST AFFECTED	2 FACILITATORS	3 DEBILITATORS	4 LEAST AFFECTED	ROW TOTAL
1		4	5	4	2	15
		26.7	33.3	26.7	13.3	28.3
		33.3	33.3	30.8	15.4	
		7.5	9.4	7.5	3.8	
2		8	10	9	11	38
		21.1	26.3	23.7	28.9	71.7
		66.7	66.7	69.2	84.6	
		15.1	18.9	17.0	20.8	
COLUMN TOTAL		12 22.6	15 28.3	13 24.5	13 24.5	53 100.0

RAW CHI SQUARE = 1.44480 SIGNIFICANCE = .6951

REA1	CHOICE: KR	NO KR	ROW TOTAL
1	33	14	47
	70.2	29.8	95.9
	100.0	87.5	
	67.3	28.6	
2	0	2	2
	0	100.0	4.1
	0	12.5	
	0	4.1	
COLUMN TOTAL	33	16	49
	67.3	32.7	100.0

CORRECTED CHI SQUARE = 1.70032 SIGNIFICANCE = .1922

REA2	CHOICE: KR	NO KR	ROW TOTAL
1	17	1	18
	94.4	5.6	36.7
	51.5	6.3	
	34.7	2.0	
2	16	15	31
	51.6	48.4	63.3
	48.5	93.8	
	32.7	30.6	
COLUMN TOTAL	33	16	49
	67.3	32.7	100.0

CORRECTED CHI SQUARE = 7.65213 SIGNIFICANCE = .0057

KR (continued)

KEA3	CHOICE: KR	CHOICE: NO KR	ROW TOTAL
1	4	1	5
	80.0	20.0	10.2
	12.1	6.3	
	8.2	2.0	
2	29	15	44
	65.9	34.1	89.8
	87.9	93.8	
	59.2	30.6	
COLUMN TOTAL	33	16	49
	67.3	32.7	100.0

CORRECTED CHI SQUARE = .01782 SIGNIFICANCE = .8938

KEA4	CHOICE: KR	CHOICE: NO KR	ROW TOTAL
1	2	3	5
	40.0	60.0	10.2
	6.1	18.8	
	4.1	6.1	
2	31	13	44
	70.5	29.5	89.8
	93.9	81.3	
	63.3	26.5	
COLUMN TOTAL	33	16	49
	67.3	32.7	100.0

CORRECTED CHI SQUARE = .76193 SIGNIFICANCE = .3827

REA5	CHOICE KR	NO KR	ROW TOTAL
1	33 70.2 100.0 67.3	14 29.8 87.5 28.6	47 95.9
2	0 0 0 0	2 100.0 12.5 4.1	2 4.1
COLUMN TOTAL	33 67.3	16 32.7	49 100.0

CORRECTED CHI SQUARE = 1.70032 SIGNIFICANCE = .1922

REA7	CHOICE KR	NO KR	ROW TOTAL
1	5 38.5 15.6 10.4	8 61.5 50.0 16.7	13 27.1
2	27 77.1 84.4 56.3	8 22.9 50.0 16.7	35 72.9
COLUMN TOTAL	32 66.7	16 33.3	48 100.0

CORRECTED CHI SQUARE = 4.76044 SIGNIFICANCE = .0291

		GROUP		
	COUNT	1	2	
	ROW PCT			ROW
	COL PCT			TOTAL
	TOT PCT			
REA1				
1		25	27	52
		48.1	51.9	96.3
		92.6	100.0	
		46.3	50.0	
2		2	0	2
		100.0	0	3.7
		7.4	0	
		3.7	0	
COLUMN TOTAL		27	27	54
		50.0	50.0	100.0

CORRECTED CHI SQUARE = .51923 SIGNIFICANCE = .4712

		GROUP		
	COUNT	1	2	
	ROW PCT			ROW
	COL PCT			TOTAL
	TOT PCT			
REA2				
1		9	9	18
		50.0	50.0	33.3
		33.3	33.3	
		16.7	16.7	
2		18	18	36
		50.0	50.0	66.7
		66.7	66.7	
		33.3	33.3	
COLUMN TOTAL		27	27	54
		50.0	50.0	100.0

CORRECTED CHI SQUARE = .06333 SIGNIFICANCE = .7728

		GROUP		
	COUNT / ROW PCT / COL PCT / TOT PCT	1	2	ROW TOTAL
REA3	1	40.0 / 7.4 / 3.7	60.0 / 11.1 / 5.6	9.3
	2	25 / 51.0 / 92.6 / 46.3	24 / 49.0 / 88.9 / 44.4	49 / 90.7
	COLUMN TOTAL	27 / 50.0	27 / 50.0	54 / 100.0

CORRECTED CHI SQUARE = 0 SIGNIFICANCE = 1.0000

		GROUP		
	COUNT / ROW PCT / COL PCT / TOT PCT	1	2	ROW TOTAL
REA4	1	3 / 50.0 / 11.1 / 5.6	3 / 50.0 / 11.1 / 5.6	6 / 11.1
	2	24 / 50.0 / 88.9 / 44.4	24 / 50.0 / 88.9 / 44.4	48 / 88.9
	COLUMN TOTAL	27 / 50.0	27 / 50.0	54 / 100.0

CORRECTED CHI SQUARE = .16750 SIGNIFICANCE = .6650

READ	COUNT / ROW PCT / COL PCT / TOT PCT	GROUP 1	GROUP 2	ROW TOTAL
1		26	26	52
		50.0	50.0	96.3
		96.3	96.3	
		48.1	48.1	
2		1	1	2
		50.0	50.0	3.7
		3.7	3.7	
		1.9	1.9	
COLUMN TOTAL		27	27	54
		50.0	50.0	100.0

CORRECTED CHI SQUARE = .51923 SIGNIFICANCE = .4712

READ	COUNT / ROW PCT / COL PCT / TOT PCT	GROUP 1	GROUP 2	ROW TOTAL
1		9	6	15
		60.0	40.0	28.3
		33.3	23.1	
		17.0	11.3	
2		18	20	38
		47.4	52.6	71.7
		66.7	76.9	
		34.0	37.7	
COLUMN TOTAL		27	26	53
		50.9	49.1	100.0

CORRECTED CHI SQUARE = .27421 SIGNIFICANCE = .6005

GPA		PEA1 1.	PEA1 2.	ROW TOTAL
2.0 TO 2.49	2.	3	0	3
	ROW PCT	100.0	0	5.6
	COL PCT	5.8	0	
	TOT PCT	5.6	0	
2.2 TO 2.99	3.	12	1	13
	ROW PCT	92.3	7.7	24.1
	COL PCT	23.1	50.0	
	TOT PCT	22.2	1.9	
3.0 TO 3.49	4.	21	1	22
	ROW PCT	95.5	4.5	40.7
	COL PCT	40.4	50.0	
	TOT PCT	38.9	1.9	
OVER 3.5	5.	16	0	16
	ROW PCT	100.0	0	29.6
	COL PCT	30.8	0	
	TOT PCT	29.6	0	
	COLUMN TOTAL	52	2	54
		96.3	3.7	100.0

RAW CHI SQUARE = 1.35436 SIGNIFICANCE = .7163

GPA		READ 1.	READ 2.	ROW TOTAL
2.0 TO 2.49	2.	0	3	3
	ROW PCT	0	100.0	5.6
	COL PCT	0	8.3	
	TOT PCT	0	5.6	
2.2 TO 2.99	3.	4	9	13
	ROW PCT	30.8	69.2	24.1
	COL PCT	22.2	25.0	
	TOT PCT	7.4	16.7	
3.0 TO 3.49	4.	9	13	22
	ROW PCT	40.9	59.1	40.7
	COL PCT	50.0	36.1	
	TOT PCT	16.7	24.1	
OVER 3.5	5.	5	11	16
	ROW PCT	31.3	68.8	29.6
	COL PCT	27.8	30.6	
	TOT PCT	9.3	20.4	
	COLUMN TOTAL	18	36	54
		33.3	66.7	100.0

RAW CHI SQUARE = 2.13789 SIGNIFICANCE = .5443

GPA	COUNT / ROW PCT / COL PCT / TOT PCT	READ 1.	READ 2.	ROW TOTAL
2.0 TO 2.49	2.	0	3	3
		0	100.0	5.6
		0	6.1	
		0	5.6	
2.2 TO 2.99	3.	1	12	13
		7.7	92.3	24.1
		20.0	24.5	
		1.9	22.2	
3.0 TO 3.49	4.	2	20	22
		9.1	90.9	40.7
		40.0	40.8	
		3.7	37.0	
OVER 3.5	5.	2	14	16
		12.5	87.5	29.6
		40.0	28.6	
		3.7	25.9	
	COLUMN TOTAL	5	49	54
		9.3	90.7	100.0

RAW CHI SQUARE = .54486 SIGNIFICANCE = .0080

GPA		READ 1.	READ 2.	ROW TOTAL
	COUNT			
	ROW PCT			
	COL PCT			
	TOT PCT			
2.0 TO 2.49	2.	0	3	3
		0	100.0	5.6
		0	6.3	
		0	5.6	
2.2 TO 2.99	3.	1	12	13
		7.7	92.3	24.1
		16.7	25.0	
		1.9	22.2	
3.0 TO 3.49	4.	2	20	22
		9.1	90.9	40.7
		33.3	41.7	
		3.7	37.0	
OVER 3.5	5.	3	13	16
		18.8	81.3	29.6
		50.0	27.1	
		5.6	24.1	
	COLUMN TOTAL	6	48	54
		11.1	88.9	100.0

RAW CHI SQUARE = 1.55507 SIGNIFICANCE = .6673

GPA		REAS 1.	REAS 2.	ROW TOTAL
2.0 TO 2.49	2.	3	0	3
		100.0	0	5.6
		5.8	0	
		5.6	0	
2.2 TO 2.99	3.	13	0	13
		100.0	0	24.1
		25.0	0	
		24.1	0	
3.0 TO 3.49	4.	21	1	22
		95.5	4.5	40.7
		40.4	50.0	
		38.9	1.9	
OVER 3.5	5.	15	1	16
		93.8	6.3	29.6
		28.8	50.0	
		27.8	1.9	
	COLUMN TOTAL	52	2	54
		96.3	3.7	100.0

RAW CHI SQUARE = .04996 SIGNIFICANCE = .8134

PEA7

GPA	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
2.0 TO 2.49	2.	0 0 0 0	3 100.0 7.7 5.6	3 5.6
2.2 TO 2.99	3.	5 38.5 33.3 9.3	8 61.5 20.5 14.8	13 24.1
3.0 TO 3.49	4.	7 31.8 46.7 13.0	15 68.2 38.5 27.8	22 40.7
OVER 3.5	5.	3 18.8 20.0 5.6	13 81.3 33.3 24.1	16 29.6
	COLUMN TOTAL	15 27.8	39 72.2	54 100.0

RAW CHI SQUARE = 2.72251 SIGNIFICANCE = .4364

CHI-SQUARE TESTS OF INDEPENDENCE:
Choice of Answer Sheet for Test 3

		CHOICE	
	COUNT / ROW PCT / COL PCT / TOT PCT	IKR	NO KR	ROW TOTAL
		1	2	
REQCRS				
1		23	10	33
		69.7	30.3	67.3
		69.7	62.5	
		46.9	20.4	
2		10	6	16
		62.5	37.5	32.7
		30.3	37.5	
		20.4	12.2	
COLUMN TOTAL		33	16	49
		67.3	32.7	100.0

CORRECTED CHI_SQUARE = .03203 SIGNIFICANCE = .8580

		CHOICE	
	COUNT / ROW PCT / COL PCT / TOT PCT	IKR	NO KR	ROW TOTAL
		1	2	
ANXF				
1 MOST AFFECTED		7	4	11
		63.6	36.4	22.4
		21.2	25.0	
		14.3	8.2	
2 FACILITATORS		10	3	13
		76.9	23.1	26.5
		30.3	18.8	
		20.4	6.1	
3 DEBILITATORS		8	6	14
		57.1	42.9	28.6
		24.2	37.5	
		16.3	12.2	
4 LEAST AFFECTED		8	3	11
		72.7	27.3	22.4
		24.2	18.8	
		16.3	6.1	
COLUMN TOTAL		33	16	49
		67.3	32.7	100.0

RAW CHI_SQUARE = 1.41865 SIGNIFICANCE = .7012

GPA		CHOICE IKR 1	CHOICE NO KR 2	ROW TOTAL
2.0 TO 2.49	2	2	0	2
		100.0	0	4.1
		6.1	0	
		4.1	0	
2.5 TO 2.99	3	8	5	13
		61.5	38.5	26.5
		24.2	31.3	
		16.3	10.2	
3.0 TO 3.49	4	12	7	19
		63.2	36.8	38.8
		36.4	43.8	
		24.5	14.3	
OVER 3.5	5	11	4	15
		73.3	26.7	30.6
		33.3	25.0	
		22.4	8.2	
COLUMN TOTAL		33	16	49
		67.3	32.7	100.0

RAW CHI_SQUARE = 1.56520 SIGNIFICANCE = .6673

GROUP		CHOICE IKR 1	CHOICE NO KR 2	ROW TOTAL
	1	15	10	25
		60.0	40.0	51.0
		45.5	62.5	
		30.6	20.4	
	2	18	6	24
		75.0	25.0	49.0
		54.5	37.5	
		36.7	12.2	
COLUMN TOTAL		33	16	49
		67.3	32.7	100.0

CORRECTED CHI_SQUARE = .66358 SIGNIFICANCE = .4153

Choice (continued)

	CHOICE		
COUNT / ROW PCT / COL PCT / TOT PCT	KR	NO KR	ROW TOTAL
TR 1	21	7	28
	75.0	25.0	57.1
	63.6	43.8	
	42.9	14.3	
2	12	9	21
	57.1	42.9	42.9
	36.4	56.3	
	24.5	18.4	
COLUMN TOTAL	33	16	49
	67.3	32.7	100.0

CORRECTED CHI SQUARE = 1.02277 SIGNIFICANCE = .3119

	CHOICE		
COUNT / ROW PCT / COL PCT / TOT PCT	KR	NO KR	ROW TOTAL
ACH 1	4	0	4
KR AND HIGHER SC ON TEST 1	100.0	0	8.9
	12.9	0	
	8.9	0	
2	11	9	20
KR AND LOWER SCO ON TEST 1	55.0	45.0	44.4
	35.5	64.3	
	24.4	20.0	
3	3	0	3
KR AND LOWER ON TEST 2	100.0	0	6.7
	9.7	0	
	6.7	0	
4	13	5	18
KR AND HIGHER SC ON TEST 2	72.2	27.8	40.0
	41.9	35.7	
	28.9	11.1	
COLUMN TOTAL	31	14	45
	68.9	31.1	100.0

RAW CHI SQUARE = 5.05472 SIGNIFICANCE = .1678

HAD KR	COUNT / ROW PCT / COL PCT / TOT PCT	CHOICE: IKR (1)	CHOICE: NO KR (2)	ROW TOTAL
YES	1	10	1	11
		90.9	9.1	22.9
		31.3	6.3	
		20.8	2.1	
NO	2	22	15	37
		59.5	40.5	77.1
		68.8	93.8	
		45.8	31.3	
COLUMN TOTAL		32	16	48
		66.7	33.3	100.0

CORRECTED CHI-SQUARE = 2.49140 SIGNIFICANCE = .1145

WOULD LIKE KR	COUNT / ROW PCT / COL PCT / TOT PCT	CHOICE: IKR (1)	CHOICE: NO KR (2)	ROW TOTAL
DEFINITELY	1	11	6	17
		64.7	35.3	36.2
		35.5	37.5	
		23.4	12.8	
MAYBE	2	10	8	18
		55.6	44.4	38.3
		32.3	50.0	
		21.3	17.0	
DOUBTFUL	3	7	0	7
		100.0	0	14.9
		22.6	0	
		14.9	0	
DEFINITELY NOT	4	3	2	5
		60.0	40.0	10.6
		9.7	12.5	
		6.4	4.3	
COLUMN TOTAL		31	16	47
		66.0	34.0	100.0

RAW CHI-SQUARE = 4.57118 SIGNIFICANCE = .2060

CHI-SQUARE TESTS OF INDEPENDENCE:
Response to Self-Focus Items

SF4	YR 1.	2.	ROW TOTAL
1.	12	16	28
	42.9	57.1	30.4
	24.0	38.1	
	13.0	17.4	
2.	11	9	20
	55.0	45.0	21.7
	22.0	21.4	
	12.0	9.8	
3.	27	17	44
	61.4	38.6	47.8
	54.0	40.5	
	29.3	18.5	
COLUMN TOTAL	50 54.3	42 45.7	92 100.0

RAW CHI SQUARE = 2.3664 SIGNIFICANCE = .3063

SF7	YR 1.	2.	ROW TOTAL
1.	33	25	58
	56.9	43.1	63.0
	66.0	59.5	
	35.9	27.2	
2.	12	9	21
	57.1	42.9	22.8
	24.0	21.4	
	13.0	9.8	
3.	5	8	13
	38.5	61.5	14.1
	10.0	19.0	
	5.4	8.7	
COLUMN TOTAL	50 54.3	42 45.7	92 100.0

RAW CHI SQUARE = 1.54032 SIGNIFICANCE = .4629

SF8	COUNT / ROW PCT / COL PCT / TOT PCT	YR 1.	YR 2.	ROW TOTAL
1.		27	18	45
		60.0	40.0	48.9
		54.0	42.9	
		29.3	19.6	
2.		16	12	28
		57.1	42.9	30.4
		32.0	28.6	
		17.4	13.0	
3.		7	12	19
		36.8	63.2	20.7
		14.0	28.6	
		7.6	13.0	
COLUMN TOTAL		50	42	92
		54.3	45.7	100.0

RAW CHI SQUARE = 3.71436 SIGNIFICANCE = .2215

SF13	COUNT / ROW PCT / COL PCT / TOT PCT	YR 1.	YR 2.	ROW TOTAL
1.		19	14	33
		57.6	42.4	35.9
		38.0	33.3	
		20.7	15.2	
2.		18	17	35
		51.4	48.6	38.0
		36.0	40.5	
		19.6	18.5	
3.		13	11	24
		54.2	45.8	26.1
		26.0	26.2	
		14.1	12.0	
COLUMN TOTAL		50	42	92
		54.3	45.7	100.0

RAW CHI SQUARE = .25912 SIGNIFICANCE = .8785

SF2	YR 1.	2.	ROW TOTAL
1.	24	21	45
	53.3	46.7	48.9
	48.0	50.0	
	26.1	22.8	
2.	9	10	19
	47.4	52.6	20.7
	18.0	23.8	
	9.8	10.9	
3.	17	11	28
	60.7	39.3	30.4
	34.0	26.2	
	18.5	12.0	
COLUMN TOTAL	50	42	92
	54.3	45.7	100.0

RAW CHI SQUARE = .84911 SIGNIFICANCE = .6541

SF22	YR 1.	2.	ROW TOTAL
1.	21	23	44
	47.7	52.3	47.8
	42.0	54.8	
	22.8	25.0	
2.	28	16	44
	63.6	36.4	47.8
	56.0	38.1	
	30.4	17.4	
3.	1	3	4
	25.0	75.0	4.3
	2.0	7.1	
	1.1	3.3	
COLUMN TOTAL	50	42	92
	54.3	45.7	100.0

RAW CHI SQUARE = 3.69593 SIGNIFICANCE = .1576

Self-Focus (continued)

SF25	YR	1.	2.	ROW TOTAL
1.	COUNT	31	25	56
	ROW PCT	55.4	44.6	60.9
	COL PCT	62.0	59.5	
	TOT PCT	33.7	27.2	
2.	COUNT	11	8	19
	ROW PCT	57.9	42.1	20.7
	COL PCT	22.0	19.0	
	TOT PCT	12.0	8.7	
3.	COUNT	8	9	17
	ROW PCT	47.1	52.9	18.5
	COL PCT	16.0	21.4	
	TOT PCT	8.7	9.8	
COLUMN TOTAL		50 54.3	42 45.7	92 100.0

RAW CHI SQUARE = .48337 SIGNIFICANCE = .7853

SF27	YR	1.	2.	ROW TOTAL
1.	COUNT	9	8	17
	ROW PCT	52.9	47.1	18.5
	COL PCT	18.0	19.0	
	TOT PCT	9.8	8.7	
2.	COUNT	21	26	47
	ROW PCT	44.7	55.3	51.1
	COL PCT	42.0	61.9	
	TOT PCT	22.8	28.3	
3.	COUNT	20	8	28
	ROW PCT	71.4	28.6	30.4
	COL PCT	40.0	19.0	
	TOT PCT	21.7	8.7	
COLUMN TOTAL		50 54.3	42 45.7	92 100.0

RAW CHI SQUARE = 5.07633 SIGNIFICANCE = .0790

Self-Focus (continued)

SF28	YR 1.	2.	ROW TOTAL
1.	9	7	16
	56.3	43.8	17.4
	18.0	16.7	
	9.8	7.6	
2.	22	15	37
	59.5	40.5	40.2
	44.0	35.7	
	23.9	16.3	
3.	19	20	39
	48.7	51.3	42.4
	38.0	47.6	
	20.7	21.7	
COLUMN TOTAL	50	42	92
	54.3	45.7	100.0

RAW CHI SQUARE = .9112 SIGNIFICANCE = .6341

REQCRS

SF4		1.	2.	ROW TOTAL
1.	COUNT	18	10	28
	ROW PCT	64.3	35.7	30.4
	COL PCT	28.6	34.5	
	TOT PCT	19.6	10.9	
2.	COUNT	15	5	20
	ROW PCT	75.0	25.0	21.7
	COL PCT	23.8	17.2	
	TOT PCT	16.3	5.4	
3.	COUNT	30	14	44
	ROW PCT	68.2	31.8	47.8
	COL PCT	47.6	48.3	
	TOT PCT	32.6	15.2	
COLUMN TOTAL		63	29	92
		68.5	31.5	100.0

RAW CHI SQUARE = .62389 SIGNIFICANCE = .7320

REQCRS

SF7		1.	2.	ROW TOTAL
1.	COUNT	42	16	58
	ROW PCT	72.4	27.6	63.0
	COL PCT	66.7	55.2	
	TOT PCT	45.7	17.4	
2.	COUNT	15	6	21
	ROW PCT	71.4	28.6	22.8
	COL PCT	23.8	20.7	
	TOT PCT	16.3	6.5	
3.	COUNT	6	7	13
	ROW PCT	46.2	53.8	14.1
	COL PCT	9.5	24.1	
	TOT PCT	6.5	7.6	
COLUMN TOTAL		63	29	92
		68.5	31.5	100.0

RAW CHI SQUARE = 3.5237 SIGNIFICANCE = .1736

REQCRS

SF8	1.	2.	ROW TOTAL
1.	31	14	45
	68.9	31.1	48.9
	49.2	48.3	
	33.7	15.2	
2.	19	9	28
	67.9	32.1	30.4
	30.2	31.0	
	20.7	9.8	
3.	13	6	19
	68.4	31.6	20.7
	20.6	20.7	
	14.1	6.5	
COLUMN TOTAL	63	29	92
	68.5	31.5	100.0

RAW CHI SQUARE = .00855 SIGNIFICANCE = .9957

REQCRS

SF13	1.	2.	ROW TOTAL
1.	23	10	33
	69.7	30.3	35.9
	36.5	34.5	
	25.0	10.9	
2.	23	12	35
	65.7	34.3	38.0
	36.5	41.4	
	25.0	13.0	
3.	17	7	24
	70.8	29.2	26.1
	27.0	24.1	
	18.5	7.6	
COLUMN TOTAL	63	29	92
	68.5	31.5	100.0

RAW CHI SQUARE = .01825 SIGNIFICANCE = .9011

REQCRS

SF2	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
1.		31	14	45
		68.9	31.1	48.9
		49.2	48.3	
		33.7	15.2	
2.		12	7	19
		63.2	36.8	20.7
		19.0	24.1	
		13.0	7.6	
3.		20	8	28
		71.4	28.6	30.4
		31.7	27.6	
		21.7	8.7	
COLUMN TOTAL		63	29	92
		68.5	31.5	100.0

RAW CHI SQUARE = .36558 SIGNIFICANCE = .8329

REQCRS

SF22	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
1.		29	15	44
		65.9	34.1	47.8
		46.0	51.7	
		31.5	16.3	
2.		33	11	44
		75.0	25.0	47.8
		52.4	37.9	
		35.9	12.0	
3.		1	3	4
		25.0	75.0	4.3
		1.6	10.3	
		1.1	3.3	
COLUMN TOTAL		63	29	92
		68.5	31.5	100.0

RAW CHI SQUARE = 4.58455 SIGNIFICANCE = .1052

REQCRS

SF25		1.	2.	ROW TOTAL
1.	COUNT	42	14	56
	ROW PCT	75.0	25.0	60.9
	COL PCT	66.7	48.3	
	TOT PCT	45.7	15.2	
2.	COUNT	14	5	19
	ROW PCT	73.7	26.3	20.7
	COL PCT	22.2	17.2	
	TOT PCT	15.2	5.4	
3.	COUNT	7	10	17
	ROW PCT	41.2	58.8	18.5
	COL PCT	11.1	34.5	
	TOT PCT	7.6	10.9	
COLUMN TOTAL		63 68.5	29 31.5	92 100.0

RAW CHI SQUARE = 7.21241 SIGNIFICANCE = .0272

REQCRS

SF27		1.	2.	ROW TOTAL
1.	COUNT	11	6	17
	ROW PCT	64.7	35.3	18.5
	COL PCT	17.5	20.7	
	TOT PCT	12.0	6.5	
2.	COUNT	33	14	47
	ROW PCT	70.2	29.8	51.1
	COL PCT	52.4	48.3	
	TOT PCT	35.9	15.2	
3.	COUNT	19	9	28
	ROW PCT	67.9	32.1	30.4
	COL PCT	30.2	31.0	
	TOT PCT	20.7	9.8	
COLUMN TOTAL		63 68.5	29 31.5	92 100.0

RAW CHI SQUARE = .18259 SIGNIFICANCE = .9127

REQCRS

SF28	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
1.		13	3	16
		81.3	18.8	17.4
		25.6	10.3	
		14.1	3.3	
2.		27	10	37
		73.0	27.0	40.2
		42.9	34.5	
		29.3	10.9	
3.		23	16	39
		59.0	41.0	42.4
		36.5	55.2	
		25.0	17.4	
COLUMN TOTAL		63	29	92
		68.5	31.5	100.0

RAW CHI SQUARE = 3.18732 SIGNIFICANCE = .2032

HADKR

SF4		1.	2.	ROW TOTAL
1.	COUNT	7	21	28
	ROW PCT	25.0	75.0	30.4
	COL PCT	38.9	28.4	
	TOT PCT	7.6	22.8	
2.	COUNT	3	17	20
	ROW PCT	15.0	85.0	21.7
	COL PCT	16.7	23.0	
	TOT PCT	3.3	18.5	
3.	COUNT	8	36	44
	ROW PCT	18.2	81.8	47.8
	COL PCT	44.4	48.6	
	TOT PCT	8.7	39.1	
COLUMN TOTAL		18	74	92
		19.6	80.4	100.0

RAW CHI SQUARE = .8439 SIGNIFICANCE = .6558

HADKR

SF7		1.	2.	ROW TOTAL
1.	COUNT	10	48	58
	ROW PCT	17.2	82.8	63.0
	COL PCT	55.6	64.9	
	TOT PCT	10.9	52.2	
2.	COUNT	4	17	21
	ROW PCT	19.0	81.0	22.8
	COL PCT	22.2	23.0	
	TOT PCT	4.3	18.5	
3.	COUNT	4	9	13
	ROW PCT	30.8	69.2	14.1
	COL PCT	22.2	12.2	
	TOT PCT	4.3	9.8	
COLUMN TOTAL		18	74	92
		19.6	80.4	100.0

RAW CHI SQUARE = 1.23956 SIGNIFICANCE = .5381

HADKR

SF8		1.	2.	ROW TOTAL
1.	COUNT	8	37	45
	ROW PCT	17.8	82.2	48.9
	COL PCT	44.4	50.0	
	TOT PCT	8.7	40.2	
2.	COUNT	6	22	28
	ROW PCT	21.4	78.6	30.4
	COL PCT	33.3	29.7	
	TOT PCT	6.5	23.9	
3.	COUNT	4	15	19
	ROW PCT	21.1	78.9	20.7
	COL PCT	22.2	20.3	
	TOT PCT	4.3	16.3	
COLUMN TOTAL		18 19.6	74 80.4	92 100.0

RAW CHI SQUARE = .17985 SIGNIFICANCE = .9140

HADKR

SF13		1.	2.	ROW TOTAL
1.	COUNT	4	29	33
	ROW PCT	12.1	87.9	35.9
	COL PCT	22.2	39.2	
	TOT PCT	4.3	31.5	
2.	COUNT	9	26	35
	ROW PCT	25.7	74.3	38.0
	COL PCT	50.0	35.1	
	TOT PCT	9.8	28.3	
3.	COUNT	5	19	24
	ROW PCT	20.8	79.2	26.1
	COL PCT	27.8	25.7	
	TOT PCT	5.4	20.7	
COLUMN TOTAL		18 19.6	74 80.4	92 100.0

RAW CHI SQUARE = 2.02743 SIGNIFICANCE = .3629

HADKR

SF2		1.	2.	ROW TOTAL
	1.	8	37	45
	ROW PCT	17.8	82.2	48.9
	COL PCT	44.4	50.0	
	TOT PCT	8.7	40.2	
	2.	4	15	19
	ROW PCT	21.1	78.9	20.7
	COL PCT	22.2	20.3	
	TOT PCT	4.3	16.3	
	3.	6	22	28
	ROW PCT	21.4	78.6	30.4
	COL PCT	33.3	29.7	
	TOT PCT	6.5	23.9	
	COLUMN TOTAL	18	74	92
		19.6	80.4	100.0

RAW CHI SQUARE = .17985 SIGNIFICANCE = .9140

HADKR

SF22		1.	2.	ROW TOTAL
	1.	9	35	44
	ROW PCT	20.5	79.5	47.8
	COL PCT	50.0	47.3	
	TOT PCT	9.8	38.0	
	2.	9	35	44
	ROW PCT	20.5	79.5	47.8
	COL PCT	50.0	47.3	
	TOT PCT	9.8	38.0	
	3.	0	4	4
	ROW PCT	0	100.0	4.3
	COL PCT	0	5.4	
	TOT PCT	0	4.3	
	COLUMN TOTAL	18	74	92
		19.6	80.4	100.0

RAW CHI SQUARE = 1.01720 SIGNIFICANCE = .6013

HADKR

SF25		1.	2.	ROW TOTAL
1.	COUNT	9	47	56
	ROW PCT	16.1	83.9	60.9
	COL PCT	50.0	63.5	
	TOT PCT	9.8	51.1	
2.	COUNT	5	14	19
	ROW PCT	26.3	73.7	20.7
	COL PCT	27.8	18.9	
	TOT PCT	5.4	15.2	
3.	COUNT	4	13	17
	ROW PCT	23.5	76.5	18.5
	COL PCT	22.2	17.6	
	TOT PCT	4.3	14.1	
COLUMN TOTAL		18	74	92
		19.6	80.4	100.0

RAW CHI SQUARE = 1.1543 SIGNIFICANCE = .5615

HADKR

SF27		1.	2.	ROW TOTAL
1.	COUNT	4	13	17
	ROW PCT	23.5	76.5	18.5
	COL PCT	22.2	17.6	
	TOT PCT	4.3	14.1	
2.	COUNT	8	39	47
	ROW PCT	17.0	83.0	51.1
	COL PCT	44.4	52.7	
	TOT PCT	8.7	42.4	
3.	COUNT	6	22	28
	ROW PCT	21.4	78.6	30.4
	COL PCT	33.3	29.7	
	TOT PCT	6.5	23.9	
COLUMN TOTAL		18	74	92
		19.6	80.4	100.0

RAW CHI SQUARE = .42481 SIGNIFICANCE = .8086

SF28	HADKR		
	1.	2.	ROW TOTAL
1.	4	12	16
	25.0	75.0	17.4
	22.2	16.2	
	4.3	13.0	
2.	4	33	37
	10.8	89.2	40.2
	22.2	44.6	
	4.3	35.9	
3.	10	29	39
	25.6	74.4	42.4
	55.6	39.2	
	10.9	31.5	
COLUMN TOTAL	18	74	92
	19.6	80.4	100.0

RAW CHI SQUARE = 3.61772 SIGNIFICANCE = .2212

SF4	LIKEKR 1.	2.	ROW TOTAL
1.	21	7	28
	75.0	25.0	30.4
	35.0	21.9	
	22.8	7.6	
2.	10	10	20
	50.0	50.0	21.7
	16.7	31.3	
	10.9	10.9	
3.	29	15	44
	65.9	34.1	47.8
	48.3	46.9	
	31.5	16.3	
COLUMN TOTAL	60 65.2	32 34.8	92 100.0

RAW CHI SQUARE = 3.2322 SIGNIFICANCE = .1987

SF7	LIKEKR 1.	2.	ROW TOTAL
1.	37	21	58
	63.8	36.2	63.0
	61.7	65.6	
	40.2	22.8	
2.	13	8	21
	61.9	38.1	22.8
	21.7	25.0	
	14.1	8.7	
3.	10	3	13
	76.9	23.1	14.1
	16.7	9.4	
	10.9	3.3	
COLUMN TOTAL	60 65.2	32 34.8	92 100.0

RAW CHI SQUARE = .93871 SIGNIFICANCE = .6254

		LIKEKR		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
SF8				
1.		29	16	45
		64.4	35.6	48.9
		48.3	50.0	
		31.5	17.4	
2.		19	9	28
		67.9	32.1	30.4
		31.7	28.1	
		20.7	9.8	
3.		12	7	19
		63.2	36.8	20.7
		20.0	21.9	
		13.0	7.6	
COLUMN TOTAL		60	32	92
		65.2	34.8	100.0

RAW CHI SQUARE = .13339 SIGNIFICANCE = .9355

		LIKEKR		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
SF13				
1.		22	11	33
		66.7	33.3	35.9
		36.7	34.4	
		23.9	12.0	
2.		22	13.	35
		62.9	37.1	38.0
		36.7	40.6	
		23.9	14.1	
3.		16	8	24
		66.7	33.3	26.1
		26.7	25.0	
		17.4	8.7	
COLUMN TOTAL		60	32	92
		65.2	34.8	100.0

RAW CHI SQUARE = .13873 SIGNIFICANCE = .9330

LIKEKR

SF2		1.	2.	ROW TOTAL
1.	COUNT	27	18	45
	ROW PCT	60.0	40.0	48.9
	COL PCT	45.0	56.3	
	TOT PCT	29.3	19.6	
2.	COUNT	14	5	19
	ROW PCT	73.7	26.3	20.7
	COL PCT	23.3	15.6	
	TOT PCT	15.2	5.4	
3.	COUNT	19	9	28
	ROW PCT	67.9	32.1	30.4
	COL PCT	31.7	28.1	
	TOT PCT	20.7	9.8	
COLUMN TOTAL		60 65.2	32 34.8	92 100.0

RAW CHI SQUARE = 1.22645 SIGNIFICANCE = .5416

LIKEKR

SF22		1.	2.	ROW TOTAL
1.	COUNT	27	17	44
	ROW PCT	61.4	38.6	47.8
	COL PCT	45.0	53.1	
	TOT PCT	29.3	18.5	
2.	COUNT	29	15	44
	ROW PCT	65.9	34.1	47.8
	COL PCT	48.3	46.9	
	TOT PCT	31.5	16.3	
3.	COUNT	4	0	4
	ROW PCT	100.0	0	4.3
	COL PCT	6.7	0	
	TOT PCT	4.3	0	
COLUMN TOTAL		60 65.2	32 34.8	92 100.0

RAW CHI SQUARE = 2.43068 SIGNIFICANCE = .2966

SF25	LIKEKR 1.	2.	ROW TOTAL
1.	35	21	56
	62.5	37.5	60.9
	58.3	65.6	
	38.0	22.8	
2.	11	8	19
	57.9	42.1	20.7
	18.3	25.0	
	12.0	8.7	
3.	14	3	17
	82.4	17.6	18.5
	23.3	9.4	
	15.2	3.3	
COLUMN TOTAL	60	32	92
	65.2	34.8	100.0

RAW CHI SQUARE = 2.83190 SIGNIFICANCE = .2427

SF27	LIKEKR 1.	2.	ROW TOTAL
1.	12	5	17
	70.6	29.4	18.5
	20.0	15.6	
	13.0	5.4	
2.	29	18	47
	61.7	38.3	51.1
	48.3	56.3	
	31.5	19.6	
3.	19	9	28
	67.9	32.1	30.4
	31.7	28.1	
	20.7	9.8	
COLUMN TOTAL	60	32	92
	65.2	34.8	100.0

RAW CHI SQUARE = .55822 SIGNIFICANCE = .7565

		LIKEKR		
	COUNT / ROW PCT / COL PCT / TOT PCT	1.	2.	ROW TOTAL
SF28				
1.		10	6	16
		62.5	37.5	17.4
		16.7	18.8	
		10.9	6.5	
2.		23	14	37
		62.2	37.8	40.2
		38.3	43.8	
		25.0	15.2	
3.		27	12	39
		69.2	30.8	42.4
		45.0	37.5	
		29.3	13.0	
COLUMN TOTAL		60	32	92
		65.2	34.8	100.0

RAW CHI SQUARE = .48126 SIGNIFICANCE = .7861

ANXF

SF4 / COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DEBILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.	2	12	5	8	27
	7.4	44.4	18.5	29.6	34.2
	11.1	54.5	25.0	42.1	
	2.5	15.2	6.3	10.1	
2.	4	4	5	4	17
	23.5	23.5	29.4	23.5	21.5
	22.2	18.2	25.0	21.1	
	5.1	5.1	6.3	5.1	
3.	12	6	10	7	35
	34.3	17.1	28.6	20.0	44.3
	66.7	27.3	50.0	36.8	
	15.2	7.6	12.7	8.9	
COLUMN TOTAL	18	22	20	19	79
	22.8	27.8	25.3	24.1	100.0

RAW CHI SQUARE = 10.4483 SIGNIFICANCE = .1086

ANXF

SF7 / COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DEBILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.	6	19	12	14	51
	11.8	37.3	23.5	27.5	64.6
	33.3	86.4	60.0	73.7	
	7.6	24.1	15.2	17.7	
2.	5	3	4	4	16
	31.3	18.8	25.0	25.0	20.3
	27.8	13.6	20.0	21.1	
	6.3	3.8	5.1	5.1	
3.	7	0	4	1	12
	58.3	0	33.3	8.3	15.2
	38.9	0	20.0	5.3	
	8.9	0	5.1	1.3	
COLUMN TOTAL	18	22	20	19	79
	22.8	27.8	25.3	24.1	100.0

RAW CHI SQUARE = 17.16822 SIGNIFICANCE = .0087

ANXF

SF8	COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DEBILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.		8	9	10	11	38
		21.1	23.7	26.3	28.9	48.1
		44.4	40.9	50.0	57.9	
		10.1	11.4	12.7	13.9	
2.		5	9	7	5	26
		19.2	34.6	26.9	19.2	32.9
		27.8	40.9	35.0	26.3	
		6.3	11.4	8.9	6.3	
3.		5	4	3	3	15
		33.3	26.7	20.0	20.0	19.0
		27.8	18.2	15.0	15.8	
		6.3	5.1	3.8	3.8	
COLUMN TOTAL		18 22.8	22 27.8	20 25.3	19 24.1	79 100.0

RAW CHI SQUARE = 2.53968 SIGNIFICANCE = .8640

ANXF

SF13	COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DEBILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.		4	13	3	8	28
		14.3	46.4	10.7	28.6	35.4
		22.2	59.1	15.0	42.1	
		5.1	16.5	3.8	10.1	
2.		7	7	9	8	31
		22.6	22.6	29.0	25.8	39.2
		38.9	31.8	45.0	42.1	
		8.9	8.9	11.4	10.1	
3.		7	2	8	3	20
		35.0	10.0	40.0	15.0	25.3
		38.9	9.1	40.0	15.8	
		8.9	2.5	10.1	3.8	
COLUMN TOTAL		18 22.8	22 27.8	20 25.3	19 24.1	79 100.0

RAW CHI SQUARE = 13.45529 SIGNIFICANCE = .0363

ANXF

SF2	COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DEBILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.		5	14	9	10	38
		13.2	36.8	23.7	26.3	48.1
		27.8	63.6	45.0	52.6	
		6.3	17.7	11.4	12.7	
2.		5	3	5	2	15
		33.3	20.0	33.3	13.3	19.0
		27.8	13.6	25.0	10.5	
		6.3	3.8	6.3	2.5	
3.		8	5	6	7	26
		30.8	19.2	23.1	26.9	32.9
		44.4	22.7	30.0	36.8	
		10.1	6.3	7.6	8.9	
COLUMN TOTAL		18	22	20	19	79
		22.8	27.8	25.3	24.1	100.0

RAW CHI SQUARE = 6.49347 SIGNIFICANCE = .3702

ANXF

SF22	COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DEBILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.		8	17	3	11	39
		20.5	43.6	7.7	28.2	49.4
		44.4	77.3	15.0	57.9	
		10.1	21.5	3.8	13.9	
2.		8	5	16	8	37
		21.6	13.5	43.2	21.6	46.8
		44.4	22.7	80.0	42.1	
		10.1	6.3	20.3	10.1	
3.		2	0	1	0	3
		66.7	0	33.3	0	3.8
		11.1	0	5.0	0	
		2.5	0	1.3	0	
COLUMN TOTAL		18	22	20	19	79
		22.8	27.8	25.3	24.1	100.0

RAW CHI SQUARE = 20.33167 SIGNIFICANCE = .0024

ANXF

SF25	COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DERILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.		8	15	11	13	47
		17.0	31.9	23.4	27.7	59.5
		44.4	68.2	55.0	68.4	
		10.1	19.0	13.9	16.5	
2.		3	6	5	3	17
		17.6	35.3	29.4	17.6	21.5
		16.7	27.3	25.0	15.8	
		3.8	7.6	6.3	3.8	
3.		7	1	4	3	15
		46.7	6.7	26.7	20.0	19.0
		38.9	4.5	20.0	15.8	
		8.9	1.3	5.1	3.8	
COLUMN TOTAL		18	22	20	19	79
		22.8	27.8	25.3	24.1	100.0

RAW CHI SQUARE = 8.5913 SIGNIFICANCE = .2031

ANXF

SF27	COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DERILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.		4	9	0	3	16
		25.0	56.3	0	18.8	20.3
		22.2	40.9	0	15.8	
		5.1	11.4	0	3.8	
2.		5	11	10	15	41
		12.2	26.8	24.4	36.6	51.9
		27.8	50.0	50.0	78.9	
		6.3	13.9	12.7	19.0	
3.		9	2	10	1	22
		40.9	9.1	45.5	4.5	27.8
		50.0	9.1	50.0	5.3	
		11.4	2.5	12.7	1.3	
COLUMN TOTAL		18	22	20	19	79
		22.8	27.8	25.3	24.1	100.0

RAW CHI SQUARE = 26.58778 SIGNIFICANCE = .0002

ANXF

SF28	COUNT / ROW PCT / COL PCT / TOT PCT	1. MOST AFFECTED	2. FACILITATORS	3. DEBILITATORS	4. LEAST AFFECTED	ROW TOTAL
1.		2	6	4	2	14
		14.3	42.9	28.6	14.3	17.7
		11.1	27.3	20.0	10.5	
		2.5	7.6	5.1	2.5	
2.		8	8	7	9	32
		25.0	25.0	21.9	28.1	40.5
		44.4	36.4	35.0	47.4	
		10.1	10.1	8.9	11.4	
3.		8	8	9	8	33
		24.2	24.2	27.3	24.2	41.8
		44.4	36.4	45.0	42.1	
		10.1	10.1	11.4	10.1	
COLUMN TOTAL		18	22	20	19	79
		22.8	27.8	25.3	24.1	100.0

RAW CHI SQUARE = 2.95792 SIGNIFICANCE = .8141

SF4	COUNT / ROW PCT / COL PCT / TOT PCT	GPA UNDER 2.0	2. TO 2.49	2.2 TO 2.99	3.0 TO 3.49	OVER 3.5	ROW TOTAL
		1.	2.	3.	4.	5.	
1.		1	1	3	13	10	28
		3.6	3.6	10.7	46.4	35.7	30.4
		50.0	25.0	15.0	35.1	34.5	
		1.1	1.1	3.3	14.1	10.9	
2.		0	1	5	7	7	20
		0	5.0	25.0	35.0	35.0	21.7
		0	25.0	25.0	18.9	24.1	
		0	1.1	5.4	7.6	7.6	
3.		1	2	12	17	12	44
		2.3	4.5	27.3	38.6	27.3	47.8
		50.0	50.0	60.0	45.9	41.4	
		1.1	2.2	13.0	18.5	13.0	
COLUMN TOTAL		2 2.2	4 4.3	20 21.7	37 40.2	29 31.5	92 100.0

RAW CHI SQUARE = 3.94998 SIGNIFICANCE = .8616

SF7	GPA					
COUNT / ROW PCT / COL PCT / TOT PCT	UNDER 2.	2. TO 2 .49	2.2 TO 2 .99	3.0 TO 3 .49	OVER 3.5	ROW TOTAL
	1.	2.	3.	4.	5.	
1.	1	1	9	26	21	58
	1.7	1.7	15.5	44.8	36.2	63.0
	50.0	25.0	45.0	70.3	72.4	
	1.1	1.1	9.8	28.3	22.8	
2.	1	1	6	7	6	21
	4.8	4.8	28.6	33.3	28.6	22.8
	50.0	25.0	30.0	18.9	20.7	
	1.1	1.1	6.5	7.6	6.5	
3.	0	2	5	4	2	13
	0	15.4	38.5	30.8	15.4	14.1
	0	50.0	25.0	10.8	6.9	
	0	2.2	5.4	4.3	2.2	
COLUMN TOTAL	2	4	20	37	29	92
	2.2	4.3	21.7	40.2	31.5	100.0

RAW CHI SQUARE = 11.58666 SIGNIFICANCE = .1968

SF8	COUNT / ROW PCT / COL PCT / TOT PCT	GPA UNDER 2.0	2.0 TO 2.49	2.2 TO 2.99	3.0 TO 3.49	OVER 3.5	ROW TOTAL
		1.	2.	3.	4.	5.	
1.		0	0	12	19	14	45
		0	0	26.7	42.2	31.1	48.9
		0	0	60.0	51.4	48.3	
		0	0	13.0	20.7	15.2	
2.		2	2	6	10	8	28
		7.1	7.1	21.4	35.7	28.6	30.4
		100.0	50.0	30.0	27.0	27.6	
		2.2	2.2	6.5	10.9	8.7	
3.		0	2	2	8	7	19
		0	10.5	10.5	42.1	36.8	20.7
		0	50.0	10.0	21.6	24.1	
		0	2.2	2.2	8.7	7.6	
COLUMN TOTAL		2 2.2	4 4.3	20 21.7	37 40.2	29 31.5	92 100.0

RAW CHI SQUARE = 10.75529 SIGNIFICANCE = .2160 REEDOM.

SF13	GPA						
	COUNT / ROW PCT / COL PCT / TOT PCT	UNDER 2.0	2.0 TO 2.49	2.2 TO 2.99	3.0 TO 3.49	OVER 3.5	ROW TOTAL
		1.	2.	3.	4.	5.	
	1.	2	0	5	11	15	33
		6.1	0	15.2	33.3	45.5	35.9
		100.0	0	25.0	29.7	51.7	
		2.2	0	5.4	12.0	16.3	
	2.	0	1	7	19	8	35
		0	2.9	20.0	54.3	22.9	38.0
		0	25.0	35.0	51.4	27.6	
		0	1.1	7.6	20.7	8.7	
	3.	0	3	8	7	6	24
		0	12.5	33.3	29.2	25.0	26.1
		0	75.0	40.0	18.9	20.7	
		0	3.3	8.7	7.6	6.5	
	COLUMN TOTAL	2 2.2	4 4.3	20 21.7	37 40.2	29 31.5	92 100.0

RAW CHI SQUARE = 17.57914 SIGNIFICANCE = .0293

GPA

SF2	COUNT / ROW PCT / COL PCT / TOT PCT	UNDER 2.	2. TO 2.49	2.5 TO 2.99	3.0 TO 3.49	OVER 3.5	ROW TOTAL
		1.	2.	3.	4.	5.	
1.		0	1	4	21	19	45
		0.0	2.2	8.9	46.7	42.2	48.9
		0.0	25.0	21.1	56.8	65.5	
		0.0	1.1	4.3	22.8	20.7	
2.		2	1	7	5	4	19
		10.5	5.3	36.8	26.3	21.1	20.7
		100.0	25.0	36.8	13.5	13.8	
		2.2	1.1	7.6	5.4	4.3	
3.		0	2	9	11	6	28
		0.0	7.1	32.1	39.3	21.4	30.4
		0.0	50.0	47.4	29.7	20.7	
		0.0	2.2	9.8	12.0	6.5	
COLUMN TOTAL		2	4	20	37	29	92
		2.2	4.3	21.7	40.2	31.5	100.0

RAW CHI SQUARE = 20.08199 SIGNIFICANCE = .0100

GPA

SF22	COUNT / ROW PCT / COL PCT / TOT PCT	UNDER 2.0	2.0 TO 2.49	2.5 TO 2.99	3.0 TO 3.49	OVER 3.5	ROW TOTAL
1.		1	1	8	17	17	44
		2.3	2.3	18.2	38.6	38.6	47.8
		50.0	25.0	40.0	45.9	58.6	
		1.1	1.1	8.7	18.5	18.5	
2.		1	3	11	19	10	44
		2.3	6.8	25.0	43.2	22.7	47.8
		50.0	75.0	55.0	51.4	34.5	
		1.1	3.3	12.0	20.7	10.9	
3.		0	0	1	1	2	4
		0	0	25.0	25.0	50.0	4.3
		0	0	5.0	2.7	6.9	
		0	0	1.1	1.1	2.2	
COLUMN TOTAL		2	4	20	37	29	92
		2.2	4.3	21.7	40.2	31.5	100.0

RAW CHI SQUARE = 4.38233 SIGNIFICANCE = .8211

SF25	COUNT / ROW PCT / COL PCT / TOT PCT	GPA UNDER 2.	2. TO 2 2.2 TO 2 3.6 TO 3 .49 .99 .49			OVER 3.5	ROW TOTAL
		1.	2.	3.	4.	5.	
1.		1	2	13	21	19	56
		1.8	3.6	23.2	37.5	33.9	60.9
		50.0	50.0	65.0	56.8	65.5	
		1.1	2.2	14.1	22.8	20.7	
2.		0	1	3	10	5	19
		0	5.3	15.8	52.6	26.3	20.7
		0	25.0	15.0	27.0	17.2	
		0	1.1	3.3	10.9	5.4	
3.		1	1	4	6	5	17
		5.9	5.9	23.5	35.3	29.4	18.5
		50.0	25.0	20.0	16.2	17.2	
		1.1	1.1	4.3	6.5	5.4	
COLUMN TOTAL		2	4	20	37	29	92
		2.2	4.3	21.7	40.2	31.5	100.0

RAW CHI SQUARE = 3.34777 SIGNIFICANCE = .9107

GPA

SF27	COUNT / ROW PCT / COL PCT / TOT PCT	UNDER 2.0	2.0 TO 2.49	2.2 TO 2.99	3.0 TO 3.49	OVER 3.5	ROW TOTAL
1.		0	0	3	10	4	17
		0	0	17.6	58.8	23.5	18.5
		0	0	15.0	27.0	13.8	
		0	0	3.3	10.9	4.3	
2.		0	2	12	16	17	47
		0	4.3	25.5	34.0	36.2	51.1
		0	50.0	60.0	43.2	58.6	
		0	2.2	13.0	17.4	18.5	
3.		2	2	5	11	8	28
		7.1	7.1	17.9	39.3	28.6	30.4
		100.0	50.0	25.0	29.7	27.6	
		2.2	2.2	5.4	12.0	8.7	
COLUMN TOTAL		2	4	20	37	29	92
		2.2	4.3	21.7	40.2	31.5	100.0

RAW CHI SQUARE = 9.1963 SIGNIFICANCE = .3331

GPA

SF28	COUNT / ROW PCT / COL PCT / TOT PCT	UNDER 2.0	2.0 TO 2.49	2.2 TO 2.99	3.0 TO 3.49	OVER 3.5	ROW TOTAL
		1.	2.	3.	4.	5.	
1.		0	1	3	7	5	16
		0	6.3	18.8	43.8	31.3	17.4
		0	25.0	15.0	18.9	17.2	
		0	1.1	3.3	7.6	5.4	
2.		1	1	8	14	13	37
		2.7	2.7	21.6	37.8	35.1	40.2
		50.0	25.0	40.0	37.8	44.8	
		1.1	1.1	8.7	15.2	14.1	
3.		1	2	9	16	11	39
		2.6	5.1	23.1	41.0	28.2	42.4
		50.0	50.0	45.0	43.2	37.9	
		1.1	2.2	9.8	17.4	12.0	
COLUMN TOTAL		2 2.2	4 4.3	20 21.7	37 40.2	29 31.5	92 100.0

RAW CHI SQUARE = 1.33673 SIGNIFICANCE = .9951